Using the Web as Input and Discourse Interactions for the Construction of Meaning and the Acquisition of Lexical Units in University Level English as a Foreign Language

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Abstract

The purpose of this mixed-methods study was to examine the impact of Web multimodality plus dialogical interactions in the acquisition and retention of novel lexical items among EFL students under a social constructionist framework. The lexical acquisition of 107 1st-year English majors at the University of Costa Rica was analyzed through Simultaneous Multiple Linear Regression and discourse analysis. Treatment A group, exposed to multiple Web input sources and allowed to discuss their findings dialogically, was compared to an only-Web group and a Control group. The difference in means between pre and posttests indicates that scores increased after each treatment. The Control group showed a decrease between pre and posttest mean scores. The results of the regression were statistically significant and the marginal mean of the Web plus dialogue group was statistically different from the means of the Web-only and Control groups ($p < .05$). Other variables such as learning preference, language use and background did not have any predictive power in the model. The qualitative section showed that students positively appraised the use of Dictionary.com and Google Translate in the search for meaning. This finding reinforces the validity of using the Web to present novel vocabulary to EFL students. The examination of 64 learners' oral interactions demonstrated that the majority of their interventions indicated co-construction of knowledge supporting Gunawardena et al.'s model (1997, 1998) and the use of Repetition, Code mixing, and Social content strategies. The progression of learners' interactions along the different phases of the co-construction model provided evidence of meaning creation and accounted for the development of a semantic framework for the comprehension of the target vocabulary through the collaboration of the different participants. The results of this study have pedagogical implications by informing

practitioners about student preferences when integrating multimodalities into FL instruction and the intrinsic value of dialogical interactions in the social construction of meaning.

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Chapter 1

The best example of coherence is displayed when words and actions coalesce. This coalition is illustrated in the etymology of the term *word* in Hebrew. For the ancient Jewish culture "words didn't just contain meaning, they contained power. The Hebrew word *dabar* means both 'word' and 'deed.' The two were inseparable" (Morgan, 2005, p. 25). The power of words to "do" and to "create" serves as the basic premise for this work, in particular, in the creation of meaning within the space of oral inter-*action.* Certainly, in these spaces of interaction, there is power in both words and actions, in the discovery of oneself and others, and in the creation of meaning.

The present study addressed the acquisition of vocabulary in the context of English as a foreign language and the ways in which learners interact orally to create meaning. This usage-based model is clearly in line with an interactional perspective of language use. In the case of foreign language learning, the use of a "new" linguistic unit is far from a simple re-labeling of known forms, but a process in the construction of meanings. By emphasizing meaning construction and language use, the "speakers" take precedence and the context in which such linguistic elements are utilized becomes relevant for the interpretation of utterances. Indeed, users' communicative efforts in particular contexts are key to the creation of meaning in which learners, far from passive recipients of knowledge, become active participants in the language acquisition process. As part of the process, learners interact not only among themselves but also with the input received, mostly electronically in today's academic environment.

Because of the emphasis on interactional relations, the evolving nature of meaning, and the role of context in the acquisition of language, a sociological standpoint that views language as a social construction is required as epistemological framework for support. Social

constructionism, in its attempts to decipher the intricacies of meaning, stands as the most akin epistemology for this research because of the relevance it gives to the interactional quality of language and the importance of subjects and context in the creation of meanings. Within this epistemological framework, dialogical interactions and the preeminence of oral speech take precedence as the basic units of analysis in learners' creation of meanings.

Finally, in order to deal with the multi-faceted and evolving nature of language, Pragmatism plays a significant role both in terms of its connection with the epistemological framework established in this work and the particular choice of a mixed-approach research methodology. Such coherence among the different components of this study establishes the theoretical foundation for the search of meaning in learners' interactions.

Purpose of the Study

Considering the tendency to view vocabulary acquisition mostly from an information-processing position with emphasis on cognitive perspectives, and from a mainly positivist research approach, the present study offers a contrasting view, that far from downplaying the importance of current investigations, provides a more holistic and eclectic perspective on the complex and multidimensional quality of lexical development. Such complexity can better be approached from a research perspective that allows both quantitative and qualitative tools to aid in elucidating the epistemological intricacy of meaning creation.

In an attempt to expand the ways in which language learning is viewed, to link such field to parallel developments in the philosophical field, and to be more inclusive in the participation of students in the learning process, this research focuses on the process of meaning creation within the more encompassing and flexible framework of social constructionism. The intention

is to discover the ways in which foreign language learners construct meanings through their oral interactions when prompted by multiple Internet resources.

Statement of the Problem

Words by themselves are the embodiment of oral or written communication. Indeed, words are the founding blocks of languages; that is why vocabulary learning is a fundamental part of linguistic development, and more than that, lexis is an intrinsic component in the acquisition and development of knowledge. It is a truism to state that language learners are seriously concerned with vocabulary learning and certainly view vocabulary as key to the development of their language skills. Some researchers also consider vocabulary development critical for English language learners (ELL) (August, Carlo, Dressler, & Snow, 2005), and certain efforts have been made to improve the chances of ELL's academic success by expanding their vocabulary either through direct instruction (Manyak & Bauer, 2009), the integration of technology (Sox & Rubinstein-Avila, 2009), or the combination of computer-based instructional practices and strategies (Liu, Moore, Graham, & Lee 2002). In contraposition, some experts in the area of Second Language Acquisition have divergent positions concerning the role of vocabulary in language learning, and second language researchers have, for the most part, focused their attention on the construction of theories of language development that depart from the basic word and deal more with syntactical elements, discourse, or phonology as more central to language learning and teaching (Zimmerman, 1997). In general, vocabulary learning has been linked with reading comprehension (Wallace, 2008), incidental learning through extensive reading (Horst & Meara, 1999; S. A. Webb, 2009), technology-enhanced reading environments (J. Li, 2009), and even vocabulary development through online reading (Loucky, 2007). Vocabulary development through reading is an obvious and expected fusion; however, such

emphasis has limited the role of vocabulary in other areas of language development and has led researchers to disregard the encompassing functions of words in the construction of meaning and the development of identity. This construction of meaning and identity is at the core of a sociolinguistic view of language. Indeed, analyzing vocabulary acquisition from a sociolinguistic position could shed light on elements of language acquisition that have been neglected so far, especially in the field of English as a foreign language.

The present study not only dealt with the teaching of English vocabulary in a foreign context (Costa Rica), but also focused on the learning experiences of students and on their construction of knowledge through dialogical interactions. This constructionist, dialogical, mixed-method-research approach with its pragmatic threads pretended to show how learners construct meanings when acquiring lexical units.

Significance of the Study

Word meaning is a vital component in foreign language acquisition. Understanding how word meanings are appropriated in the social context and in dialogic interaction can shed light on the general process of language acquisition. The potential significance of this research lies in the opportunity to learn from students' experiences, to create more participatory conditions for the main contributors in the educational act, and to account for the value of individual experience as the source of knowing, however partial it may be. Furthermore, a model that describes the significance of technology for learning or its drawbacks has clear implications for practice due to the incumbent position of instructional technologies in today's educational settings. In fact, as the tendency is to incorporate more technology, it is necessary to have evidence of the potential benefits of doing so or the drawbacks that such inclusion represents pedagogically.

It is also significant to try to incorporate foreign language research within more encompassing and flexible research and philosophical systems due to the complexity of learning and the myriad of elements that meaning formation embodies. Under a more inclusive and interdisciplinary light, the intricacies of lexical development, students' personal strategies, environmental elements, pedagogical tools, and instructional practices could be analyzed in a more comprehensive and practical way.

Research Questions

This study addressed five research questions concerning vocabulary acquisition through dialogical interactions and students' construction of meaning of lexical items. The main questions addressed in this study can be stated thus:

1. Do dialogical interactions prompted by multiple input modalities from the Web (Google Web search, Google images, dictionary definitions, and translations of the terms) lead to differential acquisition of target lexical units than only multiple modalities without the dialogical component?
2. Considering students' learning styles, measured through the ATTLS, is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?
4. Based on self-reported data, do learners express a preference for a particular input modality from the Web to learn vocabulary?

5. Based on the analysis of transcribed oral conversations, how do learners construct meaning through their dialogical interactions?

Definition of Terms

The present research relies on the use of particular concepts and technical jargon. While some of the concepts were basically defined in terms of the present research, some others represent the typically accepted jargon and abbreviations of the field.

CAVA: Computer Assisted Vocabulary Acquisition

Dialogical interactions: The term "dialogical interactions" was constantly used in this study intentionally following Linell's definition of the term in relation to dialogical theories or dialogism (p. 11). Linell sees the term in general as "human sense-making" in an attempt to describe and explain "human action and language use in real mundane life" (very much in line with the major objective of this work). Linell continues reaffirming that "a human being, a person, is interdependent with other's experiences, actions, thoughts, and utterances." So, it is valid to use "attributes like 'social, interactional and contextual'" (p. 12). Considering the aforementioned characteristics of dialogical interactions, their connection with the social construction of meaning became evident. Therefore, dialogues had to be considered as vital for the formulation of this research analysis. As such, and in line with Linell (2009) and originally with Rommetveit's dialogical approach (Hagtvet & Wold, 2003), this research advocated dialogism as a platform for the social construction of meaning.

EFL: English as a Foreign Language

ELL: English Language Learners

ESL: English as a Second Language

Interaction: Linell emphasizes, "talk (in interaction) [as] the primordial form of human communication" (p. 27). However, interaction also takes place between the individual and

written texts, Internet, or visual elements. The current definition of interaction is also in line with a sociocultural position as stated by Ellis (R. Ellis & S. Fotos, 1999).

I/O: Input/Output

Lexical units: I appropriated Bogaards' definition of lexical units. Bogaards (2001) defined lexical units in the context of foreign language vocabulary as "the smallest parts that satisfy the following two criteria:

a. A lexical unit must be at least one semantic constituent.
b. A lexical unit must be at least one word." (p. 325)

LFP: Lexical Frequency Profiling, an estimate of the size of written productive vocabulary proposed by Laufer and Nation (1995)

L1: First Language

L2: Second Language

Multimodality: In the context of this research, multimodality is simply understood as the use of different modes to display the meanings of words in the Web. For the purposes of the present work, those modes were integrated into a single Webpage in which each target word was linked to different Web services, to name: A Google web search of the term, a Google image of the lexical unit, a Dictionary.com definition of the word, and finally a link to Google translate (Appendix A).

SLVA: Second Language Vocabulary Acquisition

VLS: Vocabulary Learning Strategies

Epistemological Framework

Nothing is more conspicuous for language users than language itself; however, it is generally overlooked. Only when in a foreign land do we become keenly aware of how much we

take this ability for granted, and it is mostly when learning a foreign language that we begin to consider the intricacies of words and their meanings. However, far from being ignored, meaning and its connections with reference, concepts of truth, and knowledge have been a major concern in many philosophical currents. Nonetheless, in the field of second language acquisition, major syntactical and phonological perspectives have been favored in detriment of the philosophical considerations of meaning, and a great proportion of research on vocabulary acquisition has been focused on cognitive and structural approaches. Considering this bias, it is my contention that vocabulary per se and consequently research on the field cannot be fully comprehended if we undervalue the intricacies of meaning and their philosophical underpinnings.

The aforementioned emphasis on positivist perspectives is based on a vision of a concrete external reality that radically differs from the socially constructed one. This dichotomy is also prevalent in linguistics and semantics. In fact, in "General Semantics," David Lewis wrote:

> I distinguish two topics: first, the description of possible languages or grammars as abstract semantic systems whereby symbols are associated with aspects of the world; and, second, the description of the psychological and sociological facts whereby a particular one of these abstract semantic systems is the one used by a person or population. Only confusion comes of mixing these two topics. (1983, p. 190)

In alignment with this distinction, caution should be taken as not to merge perspectives and to establish a clear line of thought from the beginning. With respect to meaning and related aspects of knowledge formation, several positions have been developed historically. Despite the difficulty of ascertaining what particular school of thought better exemplifies the main focus in this work, for the present purposes, I opt for the term social constructionism. As it is the case

with most definitions, categorizing is definitely difficult insofar as the terms under each evolving label may refer to divergent concepts or ideas depending on a myriad of factors. So for the moment, social constructionism is going to be considered in terms of the historical development of ideas that led to its inception into the academic discourse. With such framework, it is worthwhile to trace back the elements of knowledge and meaning formation that have a bearing on the understanding of lexical items in language. Such history is full of intersecting avenues, deviations, parallel ways, divergent ones, and even alleys and pathways coming out of the main venues.

It is overwhelmingly complex to trace the origin of ideas to one single source. Like a reminder of how discourse is created by the collaboration and negotiation of many, the world of knowledge creation and transmission is one of constant dialectical interaction. Present day social constructionism is far from a clear-cut operational construct. To understand it, it is necessary to view it as an evolving form of thinking that attempts to understand complex systems.

Social constructionism. As it runs counter to foundational philosophical perspectives, social constructionism can be considered a novel perspective on research; however, some basic tenets appeared as early as the 17th century in the work of Giambattista Vico (1668-1774) and in subsequent philosophical movements like Husserl and Merleau-Ponty's phenomenology, in hermeneutics (Heidegger, Ricoeur, Habermas), in Marxism (Bahktin), and in the positions of several thinkers like Vygotsky, Herbert Mead, Wittgenstein, Bateson, Labov and others (Hibberd, 2005; Lock & Strong, 2010).

From all the thinkers listed above, Wittgenstein, specifically, deserves a special mention. Wittgenstein provided an alternative perspective on meaning formation that included novel components to the prevailing views of the time. After holding a foundational perspective for

many years, and dissatisfied with some of its tenets, Wittgenstein developed a more social position giving meaning a more restricted sense: "For a *large* class of cases—though not for all—in which we employ the word 'meaning' it can be defined thus: the meaning of a word is its use in the language" (*PI* 43).

The core tenet in Wittgenstein is his conception of meaning as use. As we have seen, traditional conceptions of meaning were mostly essentialist and representational (pointing to something external in reality or internal in the mind). By providing a novel perspective on meaning, Wittgenstein arrives at the conclusion that "if we had to name anything which is the life of the sign, we should have to say that it was its *use*" (Wittgenstein, 1965, p. 4). As it is clear in Wittgenstein's position, meaning and use go hand in hand. This position is central to subsequent developments of social constructionism.

In modern times, social constructionism is generally traced back to the work of Berger and Luckmann and their phenomenological approach to the sociology of knowledge (Wodak, Johnstone, & Kerswill, 2011). But as it is usually the case, their work was influenced by other ideas in the prevailing discourse: "Peter Berger and Thomas Luckmann's groundbreaking book *The Social Construction of Reality* was first published in 1966, and the two authors stress their indebtedness to the sociology of knowledge of Karl Mannheim's *Ideologie und Utopie*, first published in 1929" (Teubert, 2010).

Many more connections could be established between diverse thinkers that upheld positions concerning the social construction of knowledge. However, there are seminal voices that have to be mentioned as precursors of the development of constructionism, the youngest offspring of constructivism. Piaget stands as a remarkable figure in the development of a clearly defined epistemological position on learning. Richardson (1997) points out that Piaget

developed his theory based on a biological analysis and concentrating on cognitive development that is constructed with the aid of learning environments aimed at rational thinking. The cognitive and rational underpinnings of his theory and his idea of an individualist development separate him from social constructionism, but the seeds of co-construction were laid by his theory. The distance that a theory such as Piaget's establishes between the individual and the social context is certainly juxtaposed with Vygotsky's sociocultural constructivism. For Vygotsky, "individual development cannot be understood without reference to the interpersonal and institutional surround which situates the child. The social context is mediated through sign systems, such as language and number classifications, which are historically produced artifacts" (Richardson, 1997, p. 26).

Moving the discourse to the American continent, the pragmatists seem to be the ones that show more affinities towards present-day social constructionism. John Dewey in particular upholds conceptions on meaning and social interaction with definitive constructionist undertones. When writing about nature, communication and meaning, Dewey seems to disfavor essentialist positions and to place meaning in the use and experiences attached to words and their potential to produce actions (Dewey & Boydston, 1981).

Although the aforementioned scholars are some of the precursors of constructionism, they cannot be labeled as belonging to this category. Many of their assertions fall within this conception of knowledge but many others deviate from what is present day constructionism, which keeps evolving and changing as an intrinsic part of its contingent characteristic.

Why social constructionism. Two key considerations serve as the basic premises for the use of social constructivism as the major epistemological base for this work:

- You learn language from others.
- You learn language through the use of language.

Matters that deal with the innate aspects of language, universals, essentialism, cognitive elements, the workings of the mind, or structuralism despite their importance in other areas of knowledge have little bearing with the social construction of meaning in discourse. For instance, Gergen's social constructionism prioritizes the community and human relationships over the individual, avoiding "psychological explanations for microsocial process" (Larochelle, Bednarz, & Garrison, 1998, p. 239). In contraposition to previous conceptions, social constructionism deals directly with aspects of knowledge and meaning formation, as they are created in the interaction between and among individuals within particular contexts, contrary to foundational philosophical positions.

Trying to determine the meaning of the term constructionism seems paradoxical because what should be emphasized is the social construction aspects of meaning that cannot be ascribed to a specific point in time, a specific philosopher or movement but to "a continuous and unsystematic appropriation of past meanings to forge present understandings" (Gergen, 1994). For the sake of argumentation and as a practical example of how meaning is created, let us take a look at some of the uses of the term constructionism and its present status under different, and at times, contradictory senses.

The term constructionism is far from being novel. It was known and used in the 19th century (1827-1899), but it had a peak at the end of the 90's. Constructionism was initially used as a political term in the 19th century usually in phrases such as "strict or bland constructionism" (Google NGram). In the last decade of the 20th century, when the term seems to have come to its peak in use, construct[ion/iv]ism (Steffe & Gale, 1995) advocates certainly agreed on some

major premises while making distinctions between different branches of inquiry: constructivism, social constructivism, radical constructivism, information-processing constructivism, social constructivism, objective social constructionism, or interpretive social constructionism, dark or light, macro or micro, and weak or strong social constructionism (Burr, 1995; Harris, 2010; Hibberd, 2005; Holstein & Miller, 1993; Lock & Strong, 2010; Parker, 1998; Steffe & Gale, 1995; Velody & Williams, 1998). According to Burr (1995), there are basic assumptions that constructionists believe in. Citing Gergen (1985), Burr lists the following as basic precepts of constructionism:

1. A critical stance towards taken-for-granted knowledge.
2. Historical and cultural specificity.
3. Knowledge is sustained by social processes.
4. Knowledge and social action go together. (Burr, 1995)

Two elements intrinsic to social constructionism are its concern with meaning "specific to particular times and places" and "the view that meaning and understanding have their beginnings in social interaction, in shared agreements as to what these symbolic forms [language] are to be taken to be" (Lock & Strong, 2010). In sum, the constructionist perspective upholds first and foremost the notion of the social construction of meaning. In this construction, the idea that the meaning of things is not inherent is common among different researchers in sociology--Berger & Luckmann, 1966; Blumer, 1969; Mead, 1934; Schutz, 1964--and this is a basic premise for those who advocate Interpretive Social Constructionism (Harris, 2010). Together with the importance of meaning, language is in the foreground of social constructionism: "In its radical form, social constructionism does not commence with the external world as its fundamental concern (as in the exogenic case) or with the individual mind (as endogenecists would have it),

but with language" (Steffe & Gale, 1995). Actually, "all versions of social constructionism now focus on an unbroken, contingent flow of communicative interaction between human beings" (Steffe & Gale, 1995). The emphasis on language and interaction plus their function in the social creation of meaning becomes the basic assumptions for the present investigation.

Castelló and Botella provide a list of nine metatheoretical features shared by constructivism and social constructionism (a paradoxical situation so long as constructionism avoids essential theories). Seven of those principles perfectly define the reference frame for this work:

1. Being human entails construing meaning.
2. Meaning is an interpretative and linguistic achievement.
3. Language and interpretations are relational achievements.
4. Relationships are conversational.
5. Conversations are constitutive of subject positions.
6. Subject positions are expressed as voices.
7. Voices expressed along a time dimension constitute narratives. (Kincheloe & Horn, 2007)

From this list, the preeminence of voices, subjects, and conversations in the human construction of meaning is at the core of this research.

As a final remark, it is simply perplexing to notice how an epistemological conception permeates every single aspect of education or as Gergen puts it, "[b]eliefs about knowledge […] inform, justify, and sustain our practices of education" (Steffe & Gale, 1995, p. 17). In the specific case of human discourse, an objective, essentialist, universal, realist, individualistic conception of knowledge views language as a system that can be studied in isolation in terms of structures. This abstraction makes it possible for meaning to be somehow decontextualized.

Under this conception, language is representational, i.e. it refers to an independent ontological reality. Furthermore, most of the linguistic utterances under this epistemological perspective are derived from a pre-existing system. If language is a system that can be analyzed and broken down into its basic components and the meaning of words is context-independent, the language curriculum perfectly fits within the "perennial paradigm" (Schubert, 1986). This objective perspective is in line with the linear, Tyler-style curriculum with its advocacy for behavioral objectives and a positivist perspective that have had a great impact in the teaching of languages. Pedagogy, under this position, is simply viewed as the transmission of knowledge from a knower to a novice through language. In other words, the abstract components of language can be taught regardless of its social elements.

On the other hand, from a sociocultural perspective, language is multi vocal and dialogical, grounded on a historical and sociocultural background. In its dialogical function, language is used to generate meanings. A linear form of communication, say from teacher to students, would not conform to this multiplicity neither would any text that confers words a single unequivocal definition and reference in the real world. Language is therefore heterogeneous and interactional. The pedagogical implications of such a model differ greatly from what is generally advocated in our educational institutions.

Chapter Summary

In this chapter the topic of Second Language Vocabulary Acquisition (SLVA) was introduced, this time within a social constructionist framework. The significance of such approach lies in the importance of lexical units, as defined for the purposes of this study, not only in the creation of meaning but also in the development of language proficiency among foreign language learners.

It was also stated that the position that a majority of Second Language researchers have given to vocabulary acquisition within their field is problematic. For learners, vocabulary is vital for their development as language users. For many researchers, vocabulary is mainly incidental in their efforts to develop an overarching theory of language acquisition. This view has relegated vocabulary to a secondary position in research. Because of that, it is important to develop more research in this particular area and to do so from a more inclusive perspective.

Lexical items and meaning creation are particularly complex. The research questions introduced deal only with some of the elements of the lexical universe. The definition of terms and the significance of the study included in this chapter help us narrow down the approach and refer specifically to the role of learners in the creation of meaning and the importance of their lived experience as language learners. The conjunction of all these elements required a more encompassing and flexible research paradigm than the prevailing one, hence the use of social constructionism.

Finally, in order to explain the adopted epistemological framework for this work, I introduced the basic tenets of social constructionism. Social constructionism was chosen because of its intrinsic connections with meaning creation, its core tenet of defining meaning as use, its pragmatic thread (much in line with the basic research approach in this work), its critical and historical specificity, and its grounding on social action. As being human entails the search for meaning, this search needs not be an isolated enterprise. Social constructionism provides a platform for relational endeavors, conversations, voices and narratives that together conform the basic universe of language learning.

Chapter 2
Review of Literature

Gass (1988) upheld the position that linguistics placed the lexicon as secondary in Second Language Acquisition (SLA) research and that most studies were not concerned with the establishment of a "theory of the lexicon" but with descriptive aspects of it. Two decades later, the theoretical status of the lexicon has not varied significantly while the descriptive elements of the research in the field have grown exponentially. Zimmerman (1997) presents an historical overview of how vocabulary had been researched and studied up to the date of publication, and she offers a survey of vocabulary teaching methods (In Coady and Huckin, 1997) while Richards offers a similar account incorporating an historical overview of research and testing (Schmitt, 2000). In the same line, Laufer (2009) includes an annotated bibliography of works (limited in scope) on vocabulary acquisition from 1982 to 2008. These efforts show that vocabulary acquisition studies have become prominent in applied linguistics. The topics range from frequency studies to Computer Assisted Vocabulary Acquisition (CAVA). However, as it is generally the case in SLA, the lack of a unifying theory makes connections among studies difficult to assess. The following literature review shows the wide range of topics in the field and the differing perspectives in the studies.

The specific area of lexical learning has been labeled Second Language Vocabulary Acquisition (SLVA, Coady & Huckin, 1997). Many a paper has been written considering different perspectives on the most appropriate way to teach and learn vocabulary—topics range from input and form-focused activities to learning strategies (Laufer, 2009), and even the study of minorities such as English Language Learners (ELL) (August, Carlo, Dressler, & Snow, 2005) and deaf populations (Cannon, Fredrick, & Easterbrooks, 2010).

The Influence of Cognition in SLVA

Second language acquisition research has been dominated by cognitivist psychology in terms of "goals, methods, and constructs" (N.C. Ellis, 2006). Invariably, SLVA researchers have followed suit and included cognitivist elements into their studies. In fact, most research into vocabulary acquisition is slanted towards mentalist explanations in detriment of sociolinguistic ones. However, many of the elements that cognitivism has brought into light serve as a basis for a lot of the principles developed in this study albeit from a more encompassing and eclectic position. Also, the elements outlined below (Forms, memory, mental lexicon), although mainly important for cognitively oriented research, have some bearing in the students' noticing and retention of lexical items.

Focus on forms. The study of vocabulary in terms of form-meaning connections shows the significant influence of the cognitive approaches in the field. This particular approach examines cognitive elements such as attention and awareness in relation to input. Focus on forms has also been viewed from a contrastive analysis and translation perspective (Laufer & Girsai, 2008) or in relation to the existing semantic content of students' first language, mnemonic elements, or pedagogical implications (Deconinck, Boers, & Eyckmans, 2010; Maria J. de la Fuente, 2006; Jiang, 2002). VanPatten (2004) is one of the major advocates of the form-meaning connection approach that also includes among its basic tenets elements such as universals, input, output, and learners' factors. However, even in cognitive perspectives the prevalence of meaning for learners is obvious. Actually, studies indicate that individuals are basically more concerned with extracting meaning from input than with form. Learners rely on lexical items to get meaning, and input processing is influenced by the constraints of working memory (VanPatten, 2004).

The role of memory. Insights from cognitive linguistics also offer some light into the role of memory in vocabulary acquisition. Cognitive Load Theory (CLT) explains learning in terms of "the interaction between the task, learners' prior knowledge, and learners' cognitive architecture constraints, namely the WM [Working Memory] limitation" (Pass, Renkl, & Sweller, 2004, cited in Liu and Lin, 2011). Research on the connection between vocabulary and memory includes a variety of elements related to this construct: verbal working memory and verbal learning (Dittmann & Abel, 2010), phonological short-term memory and its effects on vocabulary learning (Gupta & Tisdale, 2009), implicit memory (Dong & Sun, 2011), audibility and pronunciation issues in relation to memory (Rosenthal & Ehri, 2011; Stiles, 2011). The constructs of verbal working memory and verbal learning were certainly relevant for the present research so long as the oral component was emphasized in the development of dialogical interactions. Besides, though not directly analyzed, memory factors played a role in terms of long-term retention of vocabulary that was measured through a delayed posttest.

The mental lexicon. One more prevalent construct, related to psycholinguistics, that guides research in vocabulary acquisition has to do with the way learners organize, associate, and access words in what has been labeled the mental lexicon. This basic construct constitutes one of the major attempts at theory in the field of SLVA (Zhang, 2009). The majority of studies on this area rely on the use of word association tests and on the premise of a mental representation of lexical units. In general, certain lexicosyntactic constraints guide researchers in their attempts to explain how learners make word associations. In this particular case, frequency of occurrence of the lexical items comes into play (Iyanaga, 2006; Rahimi & Haghighi, 2009; Takashima, 2003). Several studies on the lexicon have also shown similarities in the ways first language (L1) and second language (L2) learners organize vocabulary whose major difference is mostly

quantitative rather than qualitative (Zareva, 2007). Moreover, an overview of the mental lexicon of children shows that the strategies used by L1 and L2 learners are comparable (Kielhofer, 1994). However, there seem to be discrepancies in the L1 developmental order of derivational suffixes in L1 learners compared to English as a foreign language learners' mental lexicon (Iyanaga, 2006). Other studies on the subject show how L2 vocabulary learning and bilingual lexicosemantic representation are tied together (Barcroft & Sunderman, 2008; N. C. Ellis, 2008), try to figure out the role of the mental lexicon in languages other than English like Chinese, Japanese, and Spanish (Baralo Ottonello, 2001; Cui, 2009; Feng, 2009; Takashima, 2003), and view vocabulary learning and consequently the development of the mental lexicon as a continuum (Palmberg 1987, 1988). However, and despite the wide array of studies on the mental lexicon, because of its uncertainty, educators have very little use of this construct in the development of L1 and L2 instructional materials (Lopez Morales, 1992).

Despite their importance from a cognitive perspective, these constructs and their connection to vocabulary acquisition are not emphasized in the present sociolinguistic study. However, one cannot disregard the importance of memory, for example, in the implementation of a posttest, as is the case in this research, or the recollection of forms from a seemingly constructed "mental lexicon" in the assessment of lexical units. However, instead of thinking of these constructs as internal and individual, one should be aware of the social components necessary for their implementation and functioning.

Input, Output, and (Oral) Interaction

A sociolinguistic approach to language acquisition prioritizes interaction as a basic premise for the construction of knowledge based on the principle that language learning is a

social and interactional activity. In this respect, Ellis and Fotos (1999) make a concise analysis of the initial steps of interactional research in SLA:

> Starting with the seminal work of Evelyn Hatch in the 1970's, 'interactionists' such as Long, Pica and Gass have gradually accumulated a range of theoretical arguments in support of the general claim that, while not strictly speaking necessary, interaction nevertheless constitutes the primary means by which language learners obtain data for language learning, both in the sense that interaction is how most learners obtain input and in the sense that the input obtained through interaction works better for acquisition than input obtained in other ways. (p. ix)

As stated by Ellis, for interaction to take place, certain conditions must be present being input and output central to the construction of knowledge within the interactional perspective. Later developments in sociological theory take interaction more generally as a social practice that promotes the creation of knowledge.

I/O schemata in vocabulary. Stephen Krashen (1985) is credited as the precursor of the Input Hypothesis. Besides, in the application of his hypothesis, he also emphasized vocabulary acquisition, particularly through reading (Krashen, 1989). Despite criticism to Krashen's theory, the role of input in language learning is still pervasive. In the particular case of vocabulary acquisition, several studies give credence to its importance. For instance, in all of the studies on the mental lexicon, linguistic stimuli serve as raw material for the subsequent development of learners' vocabulary. In this case, input (in the form of spoken or written language) promotes vocabulary acquisition. In fact, the auditory and visual processing of input fosters lexical growth (Bibic & Matic, 2009; Bowers & Vasilyeva, 2011; Collins, 2009; Goodman, Dale, & Li,

2008; Jimenez Catalan & Mancebo Francisco, 2008; Pawlina Pinto, 2009; Rott, 2007; Shintani, 2011; Sydorenko, 2010; Zeng & Wang, 2007). The richness of input is variably measured in terms of the variety of words used and their complexity. Input modality can vary as well. It can be originated in teachers' speech or in written and aural forms found in video, audio recordings, captions, or stories. Evidently, in any sociolinguistic event, interaction takes place whenever speakers receive input from a specific source, thus its importance in relation to the acquisition of lexical terms.

At the other end, output becomes the explicit confirmation of language construction. Swain and Lapkin (1995) claim that the act of producing language is part of SL learning. Even though the input and output hypotheses originated within the information-processing paradigm, and they seem to be positioned in opposite ends of the language production spectrum, within the sociolinguistic framework of this work, they are reconciled. In plain terms, the dialectical interaction between input and output is plainly explained as dialogue: "As Swain and Lapkin (1998) have discussed, the concept of collaborative dialogue was extended from the output hypothesis (Swain, 1985, 1993, 1995)" (Kim, 2008, p. 114). This interrelation between input and output regularly results in vocabulary gains among individuals. A recent study in first language acquisition shows a positive correlation between maternal language output and the infant output in terms of word frequency patterns (H. Li & Fang, 2011). There are also positive effects of the relationship between input and production in the foreign language environment. Zeng and Wang (2007) point out that the dialectic relationship between input and output is essential for vocabulary gains in college ESL students. In the particular case of L2 students, research shows that negotiated interaction plus pushed output promote receptive and productive word retention, highlighting the role of output for lexical acquisition (Fuente, 2002). When

contrasted, output seems to have more positive effects than input on vocabulary learning. Students learning Japanese, when exposed to an output condition retained more words than when exposed to the input condition (Kitajima, 2001). Ellis and He obtained a similar result. They demonstrated that students exposed to modified output achieved higher vocabulary acquisition than the input groups, mainly because of the dialogic interactions that took place (R. Ellis & He, 1999; He & Ellis, 1999). Conversely, Shintani (2011) reports that in the case of production-based instruction that required students to produce output when compared to input-based instruction, both promote receptive and productive vocabulary gains.

Results on the role of input and output at times seem to be contradictory, however. One such study demonstrates that collaborative and individual output tasks make no difference in terms of gains of vocabulary knowledge (Nassaji & Jun, 2010). In other occasions, forced output (writing Spanish nouns) has no effect on word learning (Barcroft, 2006) or does not contribute to the retention of form-meaning connections (Rott, 2004). On the other hand, Browne (2004), through a quantitative study on the effectiveness of pushed output, concludes that regardless of language level, learners significantly increased the number of words learned. Considering these findings, the role of input and output on vocabulary acquisition seems to have more significant effects when combined than when analyzed individually (pushed output, for example). Such conclusion was valid for the organization of the material under investigation in the present research. As the intention was to prove that students experienced short-term vocabulary gains when exposed to both conditions, they received semantic input directly from the web. Then this input served as prompts for subsequent dialogical interactions (technically, input plus pushed output) that promoted the construction of meaning. As hinted previously,

interaction is an important component in the process. The next section deals more in detail with the relationship between interaction and vocabulary acquisition.

Interaction and vocabulary acquisition. As stated before, language learning is social and interactional. From an early age, interaction plays a significant role in the development of language. For instance, interaction between mothers and their children suggests a relationship between certain maternal speech patterns and the child's semantic patterns (Ringler, Melillo, & Stienke, 1982). Michael Long (1981, 1983) is the major advocate of the Interaction Hypothesis that emphasizes negotiation of meaning as the source of "feedback, including correction (models), comprehension checks, clarification requests, topic shifts, repetitions, and recasts. This feedback draws the learner's attention to mismatches between the input and the learner's output" (Carroll, 2001, p. 291). In the case of second/foreign language learning, interaction and negotiation of meaning are essential components for lexical development (Coady & Huckin, 1997; Fuente, 2002). The positive effects of interactions in language development also translate to the second language environment in which explanations of lexical terms, elaborated collaboratively between learners and teacher, become relevant for the acquisition of words (Lauzon, 2008).

The interactional approach to language learning has led researchers to investigate the potential benefits of dialogical interactions for learners and to examine communicative meaning as a dialogical process (Arieux, 1993). In the particular case of the present study, its interactional stance towards vocabulary learning was informed in sociocultural research that emphasized the situated elements of dialogical interactions. In this line, Noren and Linell (2007) have developed research with the intention of developing "a theory of lexical semantics and situated sense-making which aims at explaining how meaning is constituted in and across

contexts, in a dialogical interplay between lexical resources and aspects of situations (p. 387)." The present study gave precedence to context, interactions, and social characteristics of users as invaluable elements in the construction and retention of lexical meaning.

Oral interaction. One aspect of vocabulary learning that has been cursorily studied is the construct of oral vocabulary. Even though we all began developing our vocabulary through speech, once literacy is set, the written word takes preeminence over the spoken one. This preference is what Linell aptly calls "written language bias" in a namesake book (2005). From our beginning as knowers of oral representations to our posterior development as readers of the written signs, a whole process of decoding words must have been set into place. In the present research, my intention was not only to give prevalence to the search of meaning in the oral representations of language, but also to take advantage of the written signs in an effort to facilitate the decoding of meanings in subsequent interactions among learners. This relationship between oral and written representations of language has been previously researched. Hiebert and Kamil (2005) state the following in that respect: "Once a reader decodes a word, oral language plays the predominant part in comprehension. In fact, Sticht, Beck, Hauke, Kleiman, and James (1974) showed that for younger readers, up to about Grade 3, reading comprehension and oral language comprehension were roughly interchangeable" (p. 3).

Studies on oral input and its influence on vocabulary acquisition are not as prevalent as those based on written texts. This may be due to the typical composition of oral communication: less lexical richness than written input, the pervasive role of context in oral communication, and in general, the ephemeral nature of the spoken word. Bowers and Vasilyeva (2011) are among the few researchers who have studied the positive role of oral input in formal situations. They found out that vocabulary growth was positively related to the frequency of teacher speech in

general among preschool monolingual learners. However, Horst (2010), in a similar study, shows how teacher talk has little bearing on incidental vocabulary acquisition. Other L1 studies on mother-child language interactions see a connection between speech and vocabulary acquisition (Quiroz, Snow, & Zhao, 2010). In these studies, spoken word recognition seems to be correlated with lexical development. However, speech perception seems to be more predictive of vocabulary gains in the L1 than in the L2 (Cheung et al., 2010). The elements of oral interactions that promote lexical awareness and development are key to support my contention that oral interactions facilitate the construction of meaning and eventually the short-term retention of lexical items.

Finally, one area of oral speech that is more frequently studied is dialogue or conversation. Dialogues, because of their interactional qualities, certainly promote the joint construction of meaning, and therefore, the development of semantic understanding among speakers. Researchers on this particular area favor a sociocultural theoretical perspective that emphasizes the notion of knowledge as dialogically constructed. One such study conducted by Swain, Brooks, and Tocalli-Beller (2002) emphasizes the relevance of collaborative dialogue in peer-mediated learning between second language learners. An important element in the previous study is the authors' suggestion to teach learners how and why to collaborate. Likewise, Purdy (2008), in her sociolinguistic analysis of conversations around texts during reading activities, suggests ways to structure meaningful conversations that directly benefit ELL students. Using a similar perspective, Qi (2001) determines that "meaning is culturally situated" so the learning and teaching of meaning is better achieved in collaborative dialogue. Brown, Sagers, and LaPorte (1999) assert that the use of oral dialogue journals is effective for vocabulary acquisition. What is clear is that oral speech, whether in dialogues, formal or informal conversations, or peer-

to-peer collaboration positively influences lexical development in second/foreign language learners. That basic concept was essential in the development of the present work and hence the emphasis on dialogical interactions as the starting point for meaning creation.

Frequency as a Measure of Vocabulary

Related to the amount of input that students receive, the output produced, and the consequent growth of lexicon, frequency of occurrence of lexical items is a recurrent theme in studies on vocabulary acquisition. Rahimi and Haghighi (2009) in their study on Iranian students' mental lexicon point out that learners' level or word characteristics are not as determinant as word frequency in the respondents' mental links between learned words. Yet frequency is not only related to learners' mental lexicon but also forms an important component of input. Input is just one of the major determinants of what accounts for word frequency. Evidence of the value of rich input is attested in relation to the acquisition of low-frequency terms in a study by Collins (2009). Besides, a study by Goodman, Dale, and Li (2008) on parental input provides evidence of the link between frequency and the age of acquisition in the case of preschool L1 learners.

Most studies on frequency rely on written texts mainly because oral input contains less lexical density (Ellis & Fotos, 1999). In fact, frequency appears as an important variable in a variety of studies on vocabulary acquisition either as a predictor of vocabulary size (Stokes, Kern, & Dos Santos, 2012; Torki, 2011), a predictor of vocabulary learning (Joe, 2010), or in relation to age of acquisition of object naming (Bonin, Meot, Mermillod, Ferrand, & Barry, 2009). In many instances, word frequency is the basic element for the constitution of empirical tests of vocabulary knowledge (Weimer-Stuckmann, 2010; Yang, 2011; Zareva & Wolter, 2012). In the particular case of assessment of vocabulary use in L2 speakers, Laufer and Nation (1995)

developed the Lexical Frequency Profiling (LFP). LFP is a "tool which attempts to measure free productive vocabulary in the compositions of second language learners" (Laufer & Nation, 1995). In LFP, all the lexical items in a text are divided into frequency levels depending on their rate of occurrence. Edwards and Collins (2011) state that Laufer and Nation (1995) proposed the Lexical Frequency Profiling (LFP) as an estimate of the size of written productive vocabulary. In 2005, Meara questioned the reliability of the measure, a finding confirmed by Edwards and Collins (2011) who point out that the measure works with homogeneous groups. Despite its shortcomings, the idea of frequency levels was valuable in the selection of vocabulary for the present study. To guarantee that the lexical items whose meanings students created through their interactions were not learned through unrelated external input, frequency played a role in the selection of vocabulary for research. The intention was to use low-frequency lexical items in order to reduce the probability of students' encountering the terms incidentally and to minimally guarantee that the terms used would be unknown for students.

Knowing a Word

Knowing a word is not the same as knowing about a word. Knowing the definition of a word does not automatically implies the appropriate usage of the term in context. In fact, knowing a word is in itself a complex epistemological conundrum. Far from getting into long discussions of what knowing a word implies, I would refer to the generally accepted assumption that knowing a word implies knowing the meaning of a word, and meaning in the present study is understood as use (Wittgenstein's proposal that "the meaning of a word is its use in the language"). In this particular definition of meaning, language is not the transmitter of knowledge but the basic constituent of knowledge. As such, learners have control over what is learned.

As previously stated, the need for an external reference for words runs counter to the social constructionist position in this work. Therefore, to state that one knows a word when a relationship between word and external object can be established is irrelevant. Also, I mentioned research on form-meaning connections and the role of the mental lexicon. This research is based on associations; however, it is not clear whether when prompted, learners recall the form or the word, the meaning(s), the terms related to the target word such as synonyms or antonyms or all at once. However, one thing that is clear in vocabulary epistemology is that we know that we know a word when we can use it appropriately. Knowledge as use is a perfectly viable working definition for the present study. It implies that language learners can appropriately sort out the intricacies of words by using the clues provided in the interactive social context. Indeed, the social context accounts for a significant amount of first language acquisition. Moreover, the context of use becomes essential for the understanding of particular lexical items. For example, the meaning of "book" varies depending on whether it is used in a library or in a travel agency and the meaning also depends on the linguistic context in which both senses appear.

Therefore, the importance of context for comprehension lies in the learners' reliance on it to recognize the corresponding meaning of terms and their appropriate use.

In the field of SLVA, many researchers have delved into the intricacies of vocabulary epistemology. Nation (2001), for example, subdivides knowledge of a lexical item into three areas. Table 1 provides the basic categorization that Nation advocates concerning the complexity involved in vocabulary knowledge. Many of the categories implemented by Nation are in concordance with the definition of meaning as use given by Wittgenstein.

Table 1

What is involved in knowing a word? (Nation, 2001, p. 27)

Form	Spoken	R	What does the word sound like?
		P	How is the word pronounced?
	Written	R	What does the word look like?
		P	How is the word written and spelled?
	Word parts	R	What parts are recognisable in this word?
		P	What word parts are needed to express meaning?
Meaning	Form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	Concepts and referents	R	What is included in the concept?
		P	What items can the concept refer to?
	Associations	R	What other words does this word make us think of?
		P	What other words could we use instead of this one?
Use	Grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	Collocations	R	What words or types of words occur with this one?
		P	What words or types of words must we use with this one?
	Constraints on use	R	Where, when and how often would we meet this word?
		P	Where, when and how often can we use this word?

Note. In column 3, R = receptive knowledge, P = productive knowledge

As the major point of this research was to assess students' vocabulary acquisition, defining knowledge of a lexical item became one of the most obvious points. Researchers such as Coady and Huckin (1997), Laufer and Hulstijn (2001), and Nation (2001) deal with this basic

epistemological premise. Their conclusions involve many possibilities, depending on whether knowledge is viewed superficially or at a deeper, more detailed level. Actually, Laufer and Hulstijn (2001) refer to vocabulary learning in terms of *depth of processing* (Craig and Lockhart, 1972 in Gass and Selinker, 2008).

Daller and Treffers-Daller (2007), similar to Nation, subdivide vocabulary knowledge into three dimensions, represented in the following figure:

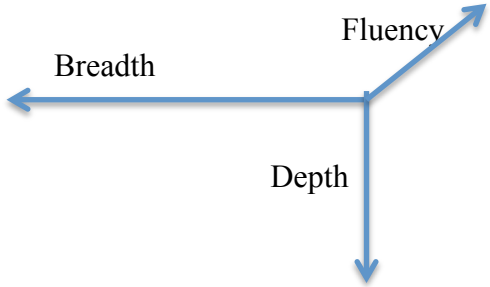


Figure 1. The lexical space: dimensions of word knowledge and ability

The horizontal axis refers to a quantitative element of knowledge: the number of words a learner knows in any way (superficially or fully). Depth refers to a qualitative knowledge of lexical items in terms of use, grammatical features, semantic elements, associations, etc. Fluency is more akin to production in the sense that it deals with the way learners are able to use words in written or oral forms. In simple terms, vocabulary size has to do with breadth. On the other hand, depth could be somehow related to frequency in the sense that the more exposed a learner is to a word, the more senses about that word the learner acquires. Fluency reflects how effectively learners use the words in speech or in writing (Very much aligned with the meaning as use premise in this work). Even though they are represented as different lines going in different directions, they are interrelated so long as the more words one knows, the more likely one is to have a deeper knowledge of their meanings and the more probable their use.

Productive and receptive knowledge. One aspect of vocabulary knowledge that is worth mentioning is the established dichotomy between productive and receptive acquisition. Gass and Selinker (2008) point out that Nation's tripartite classification (form, meaning, and use) entails both receptive and productive knowledge in his epistemological considerations of lexis. In simple terms, if a learner is able to recognize a word but is still unable to use it, we are referring to *receptive knowledge*. When a learner correctly uses a word while writing or speaking, we are dealing with *productive knowledge*. They also insist that productive knowledge includes aspects such as pronunciation, knowing precisely how to use a word in context, "nuances of meaning (as opposed to getting the general meaning), grammatical constraints (e.g., *impact* as a verb takes a direct object, but *impact* as a noun occurs in the phrase *has an impact on*)" (Gass & Selinker, 451-452). Both authors point out learners' resourcefulness in terms of receptive vocabulary and their more limited access to productive use of vocabulary. Nation (2001) makes the receptive/productive distinction too while concurrently including experimental comparisons of receptive and productive vocabulary (passive/active in some contexts).

One more epistemological dichotomy in vocabulary acquisition is the one between explicit and implicit learning of lexis or the one between direct and incidental learning. Both sets are used complementarily and they seem to be a byproduct of studies on psychology and the role of memory and awareness (Ma, 2009). However, Ma (2009) establishes the need to distinguish between the two sets of terms. She states the following concerning the "implicit/explicit teaching/learning paradigm:"

> Implicit learning is associated with natural, effortless and meaning-focused learning; explicit learning implies that learning requires deliberate mental effort (as opposed to simply engaging in meaning focused activities) and a link has to be

> established between meaning and form by various means. Secondly, learning includes teaching, as direct teaching of vocabulary can be very useful (Nation 1990, 2001; Coady 1997), the way teachers teach can influence students' decision-making in adopting specific approaches to vocabulary learning, and, finally, learners can be their own teachers. (p. 108)

In the case of oral interactions, because of the ephemeral nature of the spoken word, it is expected that most language acquisition prompted by speech is intrinsically implicit.

In sum, considering that there are many aspects related to word knowledge (meanings, orthographic and phonological elements, syntactic forms, register, associations), it is very naïve to consider that they all occur instantaneously or for that sake, that total knowledge of a language vocabulary is ever achieved. With so much to learn in terms of size and complexity, it is generally assumed that learning vocabulary is a gradual, incremental process or continuum as stated by several researchers in the field (Beltrán, Abello-Contesse, & Torreblanca-López, 2010; De Groot, 2010; Gass & Selinker, 2008; Ma, 2009; Schmitt, 2000; Takač, 2008). Considering this position, it is valid to assume that any research on the area can only pinpoint a specific moment in the long continuum towards lexical acquisition and full command of all lexical components cannot be assessed wholly.

Learning strategies and ways of knowing. Schmitt (2000) points out the increasing interest on vocabulary learning strategies (VLS), and he concentrates on what learners do to acquire vocabulary. From the great variety of strategies students may use, Schmitt categorizes them into those used to discover words and those strategies useful for consolidation of the terms in memory. The first block of strategies refers to those the individual uses on his own without resorting to a more knowledgeable peer, teacher, or native speaker (Determination strategies

[DET]). Social strategies (SOC) require the learner to interact with others while memory strategies (MEM) rely on previous knowledge or associations. The mental processes learners go through are exemplified in the cognitive strategies (COG) used, and the metacognitive strategies (MET) require the learners' awareness of their own mental processes. In the particular case of this research, social strategies that facilitate interaction become essential in the social construction of knowledge. As the purpose of this work was to find out how students constructed meaning through dialogical interactions, establishing a contrast in terms of sociological learning preferences added weight to the findings. In other words, if students whose learning preference included working in groups, then dialogical interactions would foster and increase lexical acquisition in this particular case. On the other hand, if learners were inclined to individual reflection, they would certainly benefit less from group work. As Dunn and Griggs state,

> given responsive environments, resources, and approaches, students attain statistically higher achievement and attitude test scores in congruent, rather than in incongruent treatments (Dunn & Dunn, 1992, 1993; Dunn, Dunn, & Perrin, 1994; Dunn, Griggs et al., 1995); they also behave better in style-responsive environments (Oberer, 1999). (2000, p. 11)

Keeping that in mind, it was expected to find that students who were "connected knowers" (whose learning style is favored by group interactions) would benefit from dialogues more extensively than "separate knowers" (See Galotti et al., 1999; more on this in Methodology).

Assessment

With all the aforementioned qualities of word knowledge, assessment becomes a huge challenge due to the lack of definitional power and the multidimensional quality of knowing a

word. Considering this complexity, several measures of vocabulary frequency have been devised, most of them evaluating the receptive quality of lexical items. The testing of production is a much more complex task. Daller et al. (2007) point out certain difficulties in the measures of word frequency, for example. In the case of the type-token ratio established for frequency, the measure is sensitive to text length. In the same line, Nation points out the threats to validity on vocabulary tests that range from learners' attitudes, the unit of counting used, the multi-dimensional elements of vocabulary, to the language of instruction (Daller et al., 2007). Milton agrees with Nation while Eyckmans et al. ask whether computer features can help overcome validity features. Richards and Malvern also deal with the validity of measures based on L1 frequency data and advocate for the use of multiple measures just like Tidball and Treffers-Daller and Daller and Huijuan Xue (in this last case advocating for multiple measures for oral proficiency of Chinese EFL learners with different measures of lexical richness). In the same way, Van Hout and Vermeer show their preference for mathematical transformations, proposing Guiraud and Herdan's indexes as appropriate measures. Considering the difficulties entailed in evaluating such a complex construct as vocabulary, the choice of a measure that takes into account both receptive and productive vocabulary and considers the progressive nature of lexical acquisition became essential. For that reason, the Vocabulary Knowledge Scale (Paribakht & Wesche, 1993) was used because it evaluates both productive and receptive elements and it also measures the progression of learners' developmental vocabulary knowledge understood as a continuum (More on VKS in the instrument section and in Appendix B).

The Web and Computer Assisted Vocabulary Acquisition

A technological development that has created new forms of literacy and caught the interest of educators, researchers and public in general is the World Wide Web (WWW). Vogel

(2001) looks critically at some of the ways in which the World Wide Web can be used in the teaching and learning of languages (p. 133). One of the aspects that has caused changes in pedagogy is the interactive capacity that Internet offers to its users. As students can be actively engaged in the learning process by the use of certain pedagogically sound interactive activities on the Web, this medium has created, according to some, a paradigm shift in the way education is conceived and the ways in which learning can take place. For some researchers like Salaberry (2001), the obvious benefits that the Web has brought to education in terms of interactivity and learner-centered approaches are far from being paradigmatic because these elements do not depend on the medium but on other factors.

Regardless of the factors, the Web, as it is commonly known, provides lots of resources for language learning. It contains enormous quantities of authentic material that can be used very effectively as sources of input in the language class. Bell and LeBlanc (2000) emphasize that authentic material from the Web is more effective than adapted material for use in English as second language contexts. Aside from authentic material, the Web also includes tools that could aid learners in their lexical development. For instance, Bell and LeBlanc (2000) point out the beneficial inclusion of glosses in the students' native language that are consulted more often than glosses in the target language. This finding is in accord with Yongqi Gu's research findings (2003) that emphasize the importance of the use of a bilingual dictionary that includes the students' native language. Yet if glosses are to be used, those annotations that include text and pictures are the most effective to promote retention of vocabulary among students, regardless of perceptual learning styles (Yeh & Wang, 2003). The inclusion of dictionaries, glosses, and definitional aids was of particular relevance in this research.

Finally, in the present study, I uphold the assumption that learning is positively influenced by a multiplicity of media. Research in the area supports this assumption. Sydorenko (2010) states the following:

> Multimedia, that is, a combination of print, audio, and imagery, has been argued to enhance input by making it more comprehensible (Plass & Jones, 2005). It has been shown that pictures and video can increase reading comprehension and listening comprehension (see Plass & Jones for a review). This supports Paivio's (1986, 1991, 2007) Dual Coding Theory, which states that a combination of imagery and verbal information improves information processing [….] A considerable amount of research has also been conducted on the use of multimedia for vocabulary learning. (p. 50)

Considering the significance of multimodality and its positive effects on learning, in this research, the use of Internet with links to definitions via dictionaries, thesauri, images, and a translator was included as a prompt for the introduction of the target words in the treatment groups.

Taking into account the aforementioned qualities of effective ways to learn vocabulary, a pedagogically sound tool for the introduction of vocabulary should be structured following at least some of those patterns. In this case, the use of computers with access to Internet was the logical choice. Internet offers options for annotations or glosses in different languages, direct access to bilingual dictionaries and translators, contextual elements to promote inference of meanings, authenticity of material, and visual exemplars that could even include video in some occasions. Considering the purported pedagogical benefits of computers and the Internet in the

teaching and learning of vocabulary in ESL, how can students most benefit from that resource in the appropriation of vocabulary?

Social Constructionism and Vocabulary

The present study is unique in its kind mostly because of the convergence of multimodal Web elements as input for dialogical interactions within a social constructionist epistemology. In academia, there is an abundant number of investigations dealing with vocabulary acquisition from a social constructivist position. However, the number tends to decline once other factors are included in the analysis such as the use of particular Internet resources, when the topic is narrowed to specific areas of language acquisition such as vocabulary, and especially when the epistemological framework goes contrary to the prevalent cognitive one. Social construction of meaning has been analyzed before in the case of English language learners from different cultural backgrounds (Turgut, 2006). However, the emphasis was on reading and writing. Turgut (2006) also reports other studies related to "peer interaction, social constructionism and discourse" developed from a mixed-method research analysis, to name Kong & Pearson, 2003; Nystrand & Gamoran, 1991; and Rodríguez-García, 2000 (p. 24). Furthermore, there are qualitative dissertations dealing with computer communication and the construction of learning conversations in online synchronous interaction (Lim, 2006), and specifically with vocabulary acquisition (Tai, 2005). In the latter, Tai investigates "social interaction emerging in a threaded discussion forum, particularly when adult ESL learners were assigned to argue about controversial issues. This study also investigated learners' word appropriation strategies when encountering unknown words during task engagement" (p. i). The results showed important advances in students' knowledge transmission and in the construction of meaning when encountering unknown words. As the literature review shows, works from a social

constructionist position are scarce which is surprising because constructionism, just like vocabulary acquisition, deals with the semiotic nature of knowledge. For that reason, I found it necessary to delve into the intricacies of meaning from the perspective of social constructionism and to recur to the oral elements of speech as the ones closer to the genesis of meaning in our day-to-day interactions. The originality of the present work lies in the convergence of elements: a combination of different modalities of Web input as prompts for dialogical interactions that serve as the basis for the creation of meaning in the lexical development of English-as-a-foreign-language students.

Chapter Summary

This chapter presents a detailed overview of research in the area of Second Language Vocabulary Acquisition. This field has been influence greatly by the cognitive turn in SLA scholarship as most of the studies show. The review began with the connection between form and meaning to later move to the role of memory in vocabulary acquisition and long-term retention. This cognitive element also has some bearing on the construction of a mental lexicon based on associations and lexicosemantic and lexicosyntactic features. Frequency plays a role in memory associations and it is also linked to aspects of input and output, as hinted at in the literature review. Frequency studies have also led researchers to the formulation of a Lexical Frequency Profile that plays a role in assessment and is used as a variable in many studies on vocabulary acquisition. Interactions in relation to input and output and in particular the role of dialogues in the creation of meaning are relevant elements considered in the review. Concerning strictly epistemological concerns, researchers have also tried to determine what knowing a word means. This has led to the inclusion in scholarship of a series of dichotomies related to word knowledge. Furthermore, students' use of strategies was briefly considered in the review mostly

in relation to the sociolinguistic elements useful for dialogue and in terms of the possible connection between strategy use and learning styles. Finally, aspects related to technology, and more specifically online modalities, were reviewed in relation to second language vocabulary acquisition.

In general, this literature review included some of the most salient topics developed until now in the field of Second Language Vocabulary Acquisition. The present study would hint at some of the issues included in the review, but from a different perspective. Cognitive elements, for instance, would be at the background while elements of input and output in their relation to dialogical interactions would be at the foreground. Frequency lexical profiling would not be used as a measure of vocabulary acquisition; however, it would be of value in the selection of vocabulary for the study. Vocabulary assessment issues are definitely relevant and they would be useful in the pre and posttest formulation and for the evaluation of students' construction of meaning. In the case of students' use of strategies, certain "ways of learning" were considered in relation to interactions in the classroom. Finally, online material was used to provide basic definitions of the target terms through different modalities using the Web as linguistic input. In sum, this literature review places the present work within the current scholarship while addressing these same elements of vocabulary acquisition from a different perspective. After reviewing the literature, and to the extent of my knowledge, there is a need to further investigate vocabulary acquisition in the foreign language context. Also, the concentration on cognitive, psychometric studies provides opportunities for studies that offer a contrasting epistemological perspective. The present investigation combining diverse input modalities form the Web, relying on social constructionism as its basic epistemology, using a mixed-method approach, and analyzing dialogical interactions as the basic unit of meaning creation fills a void in the area of

foreign language research that could shed light on elements of language acquisition that individual studies on the topic have not addressed.

Chapter 3
Methodology

Design of the Study

The purpose of this research was to determine the ways in which learners constructed meaning of lexical items through dialogical interactions. In order to answer the research questions, the methodology used required the mixed-methods approach to research. Johnson and Onwuegbuzie (2004) state that "[m]ixed methods research, should (at this time), use a method and philosophy that attempt to fit together the insights provided by qualitative and quantitative research into a workable solution." They later mention that they "advocate consideration of the pragmatic method of the classical pragmatists (e.g., Charles Sanders Peirce, William James, and John Dewey) (p. 16)." Pragmatically speaking, a combination of approaches was appropriate for the topic and the population under consideration. For instance, tests and surveys were devised in order to find out students' vocabulary knowledge, language background, learning styles, and preferences of particular Internet applications for their individual lexical learning processes. For the qualitative section of the research, students' interactions were analyzed to determine the ways in which meaning was constructed dialogically.

In this study, in terms of paradigm emphasis, both the qualitative and quantitative perspectives had equal status and they were organized sequentially (B. Johnson & Christensen, 2004). Concerning the type of mixed-methods approach, Creswell and Plano Clark (2010) provide a useful alternative in what they label the Convergent Parallel design (p. 69) (Figure 2). In this design, both strands occur concurrently during the same phase of the research process and equal emphasis is given to both the qualitative and quantitative components. During the interpretation, there is an independent analysis of both strands and then a mixed analysis in the end.

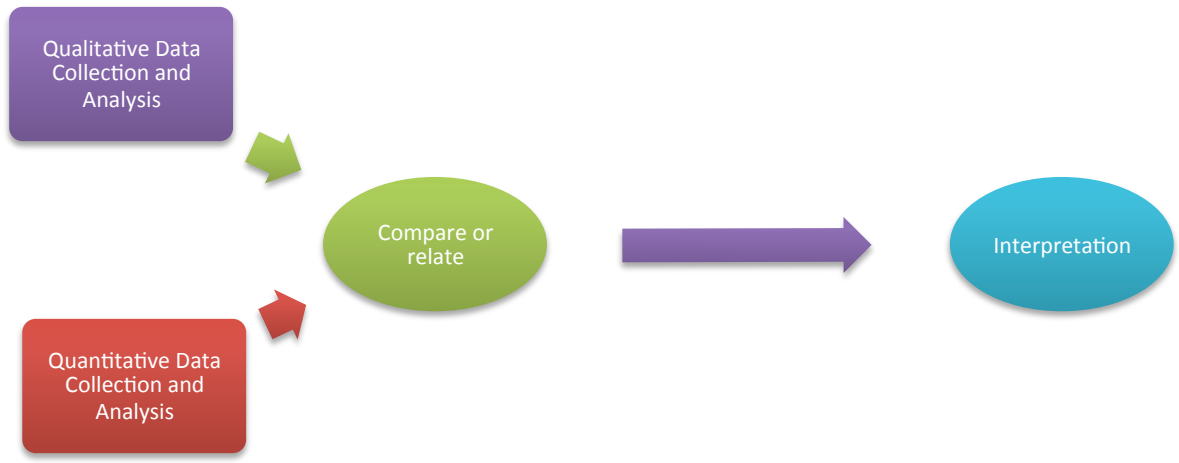


Figure 2. The Convergent Parallel Design

Creswell and Plano Clark (2010) also provide a valuable definition for this kind of research that includes "methods and a philosophical orientation:"

> Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone. (p. 5)

Similarly, Lorenzo-Dus suggests the integration of methodologies for vocabulary research. In her article, she favors a combination of qualitative and quantitative approaches, focusing on lexical sophistication rather than diversity, the use of rare words and their position in discourse, and the examiners' strategies that might affect ratings (Daller et al., 2007). Such mixture of approaches to research provided an ample overview of the complex construct of

vocabulary acquisition while offering flexibility to deal with emerging topics in the recollection of data.

Qualitative research and CAVA. Most research on the use of technology in vocabulary acquisition has been slanted towards positivist perspectives. In fact, Chapelle (1997) points out that research on Computer Assisted Language Learning (CALL) has its foundation on computational linguistics, psycholinguistics, and other forms of cognitive processing (Zhao, 2005). Warschauer (1998) poignantly states that research on technology has focused on a determinist view (the all powerful tool that produces certain outcomes) and on the instrumental view that sees computers as tools (pp. 757-758). Little attention is given to the major participants of the process: the students. Considering this, Salaberry (1999) states that other forms of research, such as sociocultural theory, could turn the view towards the participants in the learning process (p. 104).

Considering the complexity in this area of study, qualitative researchers have tried to explain some of the elements involved in the incorporation of technology in the teaching of language. Moss & Shank (2002) argue that "computer mediated interaction systems" have created "an entirely new mode of social interaction and thought […] which can only be understood using the combination of the logic and tools of qualitative research" (p. 1). Negretti clearly points out that "[a] qualitative approach can facilitate a preliminary understanding of broad new perspectives that Internet technologies open to SLA and communication" (1999, p. 76). Finally, and much in line with the present work, Provenzo (2006) asks whether technologies such as computers enhance or diminish what is learned in the classroom, how computers affect older technologies such as the book, and how traditional knowledge is affected (p. 284).

Qualitative positions and particular perspectives within the qualitative paradigm offer a clearer view of the lived experiences (Marshall & Rossman, 2010) of students in their natural classroom setting and their complex interaction with the teachers, other classmates, and the technology involved in the learning process. Besides, the qualitative paradigm with its flexibility is a viable resource for research in the constantly changing panorama of technology and its applications. Qualitative research is known for its flexibility in terms of design, framework and even research questions (Marshall & Rossman pp. 57, 73, 85, 89-90, 95).

Figure 3 provides a broad overview of the qualitative design of this research. The qualitative portion of the research is framed within a social constructionism standpoint. Such epistemology is in tune with a basic theoretical perspective that emphasizes interactionism due to the nature of the dialogical position in the creation of meaning. Symbolic interactionism requires a particular methodological stance that in this case refers to discourse analysis that by itself includes a set of specific methods for its formulation.

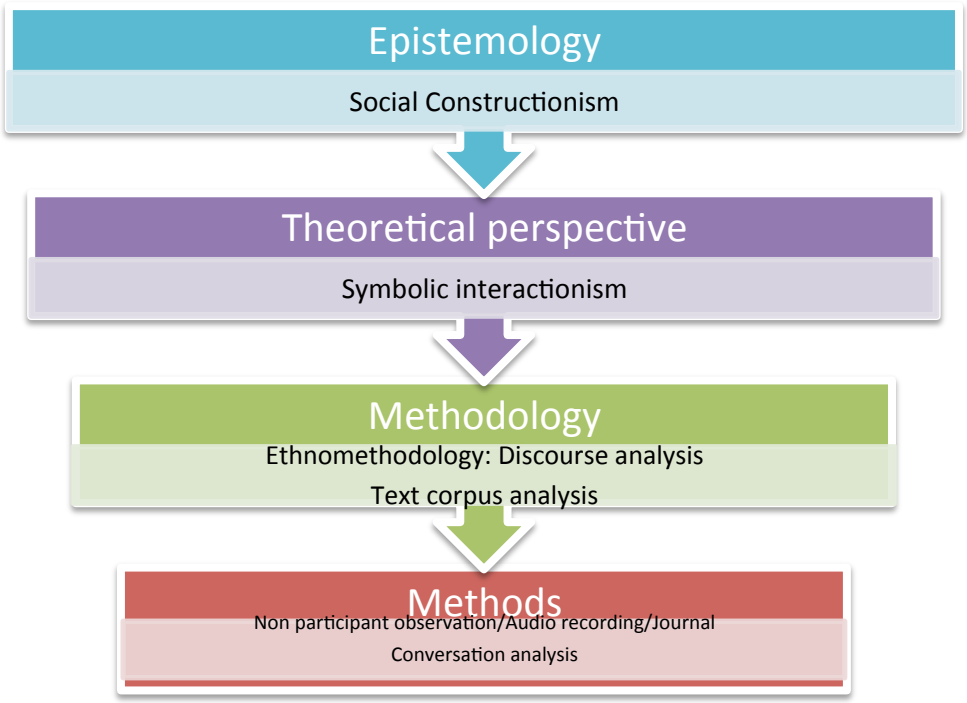


Figure 3. The four elements of research. Adapted from Crotty (1998, pp. 4-5)

In sum, the aforementioned ideas in relation to the use of technology in the classroom from a qualitative perspective provided the conceptual framework for part of this research. Foreign language learning is the overarching discipline that serves as the pedagogical framework. The inclusion of technology in this field acts as a catalyst that has modified the basic framework and has led to reformulations of literacy and pedagogical validity. Both disciplines coalesce in what has been termed as Computer-Assisted Language Learning, and some ideas concerning this field were mentioned. Finally, this work was framed into the current of qualitative research in order to see how learners prompted by Web input initiate oral dialogical interactions in their efforts to create meanings.

To conclude, I appropriate Plummer's definition of this current for the purposes of this work. Plummer says: "I use the term 'critical humanism' these days to suggest orientations to inquiry that focus on human experience—that is, with the structure of experience and its daily lived nature—and that acknowledge the political and social role of all inquiry" (In Denzin & Lincoln, p. 197). This is the appropriate perspective to hear the voice of those who are participants in the educative process and have a right to be heard (See also Nemiroff, 1992).

Participants

In order to analyze learners' construction of meaning in their encounters with novel lexical units, seven groups of English-as-a-foreign-language students participated in the study. This accounts for 107 participants in total. This population consisted of first-year college students enrolled in the first course of language learning in the English major. The course included 10 hours of regular class time plus 3 hours of language laboratory. Most students were recent high-school graduates whose ages ranged between 19 and 20. For the purpose of this study, one group was used to pilot the test and the ATTLS survey, two groups were exposed to

Treatment A (Online input + Dialogical interactions), two groups experienced Treatment B (Online input + Individual work), and there were two Control groups. All groups took the final version of the pre and post-tests (Appendix C) and the biographical data survey (Appendix D).

Qualitative Data Gathering Methods

This study addressed some of its questions using qualitative methods, including a questionnaire and an analysis of students' dialogical interactions. Research question number 5 (Based on the analysis of transcribed oral conversations, how do learners construct meaning through their dialogical interactions?) was answered based on methods that included non-participant observation to explore the nature of students' personal interaction among themselves, with the teacher, and with the media under scrutiny. The basic assumption behind this question can be stated thus: If knowledge is socially constructed by individuals, then the analysis of their interaction will produce hints as to how that knowledge is co-constructed.

In order to understand how learners constructed meaning when encountering novel lexical units, it was necessary to engage the participants in a situation in which they could encounter such terms. Comic strips displaying the target lexical units were used as prompts for the dialogical and oral nature of the interaction. The use of comic strips was undoubtedly beneficial because of several reasons: a. the written nature of comic strips as opposed to oral input prompts due to the language level of the learners and the difficulties that an extra variable (listening) would have in their performance; b. the cultural ramifications of this form that would require the negotiation of meaning among learners in a foreign context; c. the narrative characteristics of comic strips and their proximity to "authentic" dialogical interactions; d. the ludic, humorous, and artistic elements of comic strips as motivators for group discussion; e. the multimodal element of comic strips with the extra aid of visual support for the understanding of

the text; f. the close connection between text and image in comics; g. the role of comic strips in creating meaning from everyday experiences. The comic strips containing the target words were only used in the classroom with the treatment groups taking advantage of the copyright fair use disposition as stated in the following Web pages: KU statement of fair use: http://www.copyright.ku.edu/copyrightfairuse.shtml Library of Congress, United States Copyright Office http://www.copyright.gov/fls/fl102.html. The links to the different comic strips appear in Appendix E.

To comply with the regulations of fair use, the material, from different sources, was limited to one comic strip per author in a number of 25 total. The sole purpose was for research, and the comic strips were used solely in the classroom as prompts for dialogues. This material was not reproduced in printed form aside from the copies for classroom use. In sum, comic strips served as the prompt for dialogical interactions that were later recorded and transcribed for analysis.

Furthermore, a survey whose aim was to gather more relevant data about the learners' preference for a particular Internet modality was distributed after the intervention. This survey provided data to answer research question 4: Based on self-reported data, do learners express a preference for a particular input modality from the Web to learn vocabulary? (See Appendix F).

In sum, the qualitative component of the research was focused on learners' preference to a particular Web modality and on the analysis of the transcribed dialogical interactions that took place during the application of the treatment (Table 2).

Table 2

Qualitative Research Questions, Data Sources, and Analysis

Research question	**Data sources**	**Methods of analysis**
Q. 4: Do learners express a preference for a particular input modality from the Web to learn vocabulary?	Answers to Likert-style	Percentages
Q. 5: Based on the analysis of transcribed oral conversations, how do learners construct meaning through their dialogical interactions?	Digital audio recordings and their written transcriptions	Discourse/Interaction/Content analysis

Data-analysis procedures

Qualitative data were collected in two ways: (a) audio recording of students' dialogical interactions, and (b) a survey. Recorded data were then inductively analyzed using constant comparison. Categories were developed and examined for common elements that ran throughout and then they were tied together. Next, themes were extracted from these categories. Data were selectively coded for examples that illustrated the themes. This analysis was partly supported by appropriate interaction analysis techniques. Of particular use were Gunawardena, Lowe, and Anderson's Interactional Analysis Model and Gunawardena, Lowe, and Anderson's Tool for Testing Constructivist and Social-Constructivist Learning Theories (Gunawardena, Lowe, & Anderson, 1997, 1998).

For the analysis of the qualitative data, the Qualitative Research Analysis Software Dedoose was used. Researchers use Dedoose in mixed method analysis to organize data and to find patterns in the information. Concerning confidentiality and privacy issues, data were stripped of all identification information, and the software includes a two-lock system, advanced

encryption and a premium SSL-EV certificate (For more information on privacy, refer to http://www.dedoose.com/Public/Terms.aspx#PRIVACY). The survey included a single question related to the usefulness of a particular online modality for the search of word meaning (Research question # 4). Based on this information, it was possible to produce a qualitative appraisal of students' preference for a modality.

Trustworthiness

Even though it is always a challenge to get readers' trust, the systematic and rigorous process of data analysis can satisfy at least in part this basic requirement. The current analysis was supported by triangulation, understood as "different data collection modes" (Lincoln & Guba, 1985, p. 306). In this research project, the use of notes, audio recordings, and surveys guarantees a minimum of trust in the material collected. All the data were carefully assembled and dated for cross-reference purposes and third-party oversee. The use of audio recordings provided "the means for 'capturing and holding episodes of classroom life' that could later be examined at leisure and compared to the critiques that had been developed from all of the data collected" (Eisner's Referential Adequacy in Lincoln & Guba, 1985, p. 313). This adds an extra factor of trustworthiness in the data. With respect to the analysis of the data collected and the results, the aforementioned elements were put under the scrutiny of member checks. According to Lincoln & Guba (1985), member checking "is the most crucial technique for establishing credibility" (p. 314). Also, interested parties can analyze the instrument of data collection (the researcher) and the conceptual framework thanks to the availability of a reflexive journal.

Quantitative Design of the Study

This section addresses the following research questions:

1. Do dialogical interactions prompted by multiple input modalities from the Web (Google Web search, images, dictionary definition, and translation of the term)

lead to differential acquisition of target lexical units than only multiple modalities without the dialogical component?

2. Considering students' learning styles measured through the ATTLS, is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?

To answer question one, a Web page displaying links to different definitional resources for the target terms was created. Also, the results of the pre and posttests were computed using the statistical analysis software SPSS in order to provide an answer to the question. In the case of question two, the ATTLS survey provided the working data for the subsequent analysis while question three was answered based on data gathered through a biographical survey.

Procedures (Methodology). This is a quasiexperimental pretest-posttest nonequivalent control group design in which participants were tested twice (Figure 4). Initially, they were given a pretest to measure the participants' vocabulary knowledge. A similar test was repeated two weeks after the intervention. Tests were numbered to keep confidentiality and students were aware of these procedures. Instructions for the tests were given in Spanish and the directions in the text were written in Spanish too. Consent forms were distributed, and the researcher emphasized that participation was voluntary and that in no way the scores and decision to participate or not could affect their grade in the course.

Students were presented with the test and through the use of an overhead projector, they were shown how to fulfill the task. The examples and operational issues were presented in

Spanish and they included a familiar and an unfamiliar item to show them what to expect in the test. Once the pretest was taken, both Treatment groups were presented with a corpus of target lexical units displayed on a Webpage through multiple modalities (Google web search, images, dictionary definition, and translation of the term). These items served as prompts for subsequent group discussions in the next phase of the research (Exclusively for Treatment A). Discussion groups were randomly assigned and sheets with comic strips were distributed among all the members of the groups for discussion. All the groups were given instructions on how to go about the discussions and the latter were audio-recorded for posterior analysis. An optional treatment group was presented with the Web prompts but they worked individually in class with the comic strips. A third control group took both tests only.

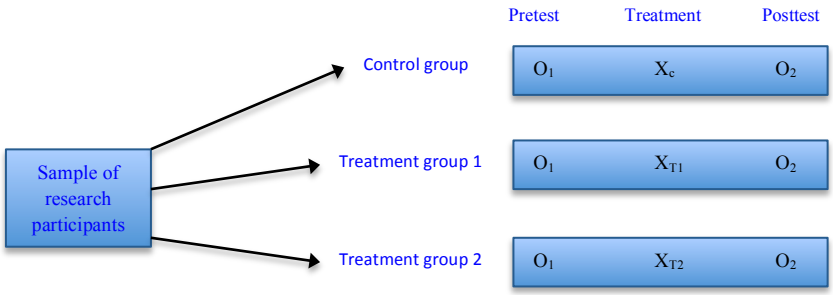


Figure 4. Pre-test-post-test-control group design

In this design, both the pretest and the posttest consisted of an assessment of vocabulary knowledge using the VKS as the basic evaluation tool. T_1 equals Treatment A (Multimodal presentation of vocabulary on a Webpage plus dialogical interactions prompted by the reading of comic strips) while Treatment B (T_2) included the Webpage with the lexical items plus individual work with the comic strips.

For the recollection of quantitative data the following procedures were followed:

1. The target vocabulary was chosen using Lexical Frequency Profiling. The text containing the target words was analyzed in order to select low frequency terms that are

more unlikely to be encountered incidentally by students. Comic strips were used in order to provide appropriate linguistic context for the target vocabulary and to later serve as prompts for the initiation of dialogical interactions among students.

2. The chosen vocabulary plus some other terms students have surely encountered in their class (Textbook vocabulary) were included in the test that was later distributed among a group of students to pilot the test.
3. Once the target vocabulary was chosen based on the results of the pilot test, a pretest was administered to the six groups participating in the main data collection test.
4. Students were exposed to the target vocabulary through a Web page that included the definitions through different modalities (Google Web search, Dictionary.com definitions, Google images, and Google Translate).
5. Students from Treatment A were randomly assigned to small groups of 5 members and provided with copies of several comic strips that included the target vocabulary. The comic strips were used as prompts for dialogue that was recorded and analyzed qualitatively.
6. Students from Treatment B worked individually with the comic strips that included the target vocabulary in context.
7. Two weeks later, a posttest was distributed to all six groups for quantitative analysis.

All participants were provided and asked to sign an informed consent statement from the Human Subjects Committee Lawrence Campus (HSCL) of the University of Kansas prior to the administration of tests (Appendix G). The consent form reassures confidentiality and grants permission for the use and administration of the instruments, including the use of recordings. Participants later completed a biographical data survey that included questions on their English

learning background and language use. Additionally, students completed the Attitude toward Thinking and Learning Survey (ATTLS) that assessed learning preferences. This survey was piloted to make sure that students fully understood the different items. More detail on the ATTLS will be provided later. These two surveys provided data to answer the following research questions:

2. Considering students' learning styles measured through the Attitude toward Thinking and Learning Survey (ATTLS), is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?

Figure 5 below graphically provides a summary of the procedures involved in the quantitative section of this work:

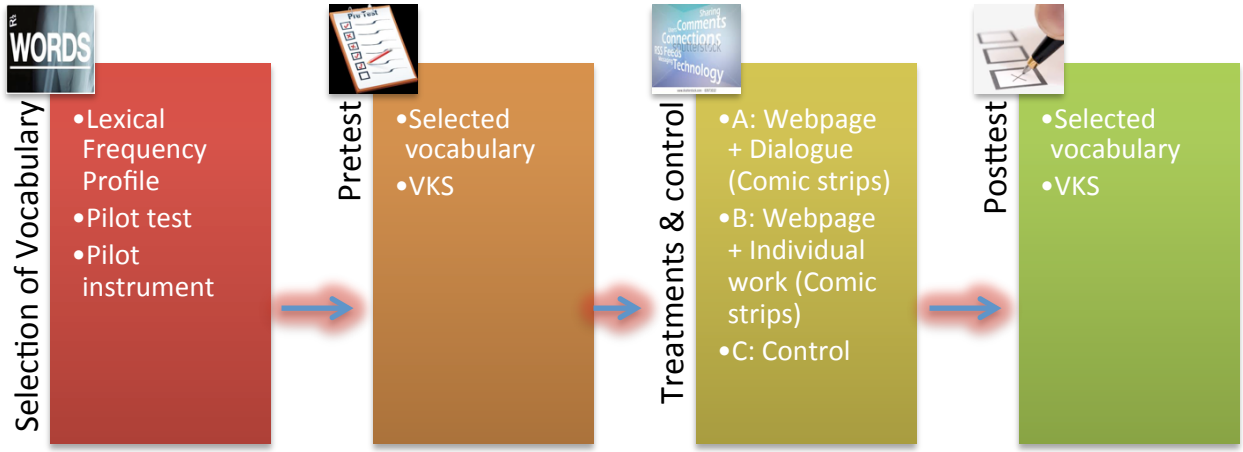


Figure 5. Quantitative Research Procedures

Measurement Instruments

The first measure taken was the determination of the students' vocabulary knowledge. This pretest baseline measure of knowledge was used to assess the participants' productive

ability of vocabulary knowledge. Coming up with a single measure to determine vocabulary knowledge is illusory. For that reason, the concentration was mostly on performance without disregarding the importance of implicit or passive lexical knowledge. It would be ideal to measure both written and oral production, but the test focused mainly on written forms due to limitations of time and resources. Aware of the limitations of a single methodological approach for assessment, the qualitative elements of vocabulary were analyzed separately. In order to be more inclusive, the test contained a section of productive vocabulary knowledge of the target lexical units. This test of productivity was chosen because of the epistemological position relating meaning of a word with its use. If students are able to use the term in a sentence, the connection to its meaning is more significant that the mere recognition of words.

The pretest was piloted prior to its implementation in the classroom. As a result of the pilot test, target items were chosen and later incorporated in the assessment. In the tests, participants were prompted to use the Vocabulary Knowledge Scale (VKS) to indicate their knowledge of the target lexical items. T. Sima Paribakht and Marjorie Wesche (1993) originally developed the VKS to evaluate learners' receptive and productive knowledge about specific lexical items. The VKS does this by assigning numerical scores (1 to 5) to lexical items. However, Wesche and Paribakht (1996) insist that these values are simply categorical and in no way represent interval values. Furthermore, Paribakht and Wesche (1997) point out that the VKS measures vocabulary acquisition and retention and is sensitive enough to reflect changes in lexical knowledge during brief instructional periods. Even though the scale is based on self-reports, it also requires students to substantiate their responses (Appendix B, Table B1). These characteristics made the use of this scale particularly useful for the purposes of this study. Wesche and Paribakht (1996) report high correlations "between students' rating and their scoring

on the same scale," and the test-retest reliability estimate (.89 for scores on 24 content words and .82 for scores on 8 discourse connectives) indicates "that the instrument can elicit acceptably reliable responses" (p. 180).

Now, concerning the basic vocabulary under scrutiny, a series of low-frequency words were the basis for providing the test-target lists of words. To facilitate the task of determining these lists, **Lexical Frequency Profiling (LFP)** was used. As the main interest was to trace the learners' lexical development from point A to point B, the *Vocabprofile*'s frequency list feature helped the researcher determine the proportion of words, counts, and families of words in the input text. What *Vocabprofile* does is to determine the proportions of frequent vocabulary and less frequent vocabulary in a specific text. By analyzing the text content with this program, the researcher obtained a list of frequent vocabulary the students could easily encounter and also the less typical terms that they would be less likely to find. In this way, a bank of low frequency lexical terms became available for comparative and evaluative purposes.

Another valuable instrument was the Attitude toward Thinking and Learning Survey (ATTLS) developed by Galotti, Clinchy, Ainsworth, Lavin, and Mansfield (1999). This survey was used to assess ways of knowing (Appendix H). This instrument has acceptable internal reliability, and it was used to determine whether there were significant correlations between connected knowing (CK) or separate knowing (SK) and dialogical ways of constructing meaning. Learners with high connected knowing would hypothetically benefit more from dialogical interactions than separate knowers.

Finally, two more surveys were of help for both the quantitative and qualitative research analysis. One of the surveys recollected the learners' use of particular modalities during the

input phase of the treatment. The other survey collected information on learners' language background knowledge and use that was used as a control variable regressed on posttest results.

Data Analysis

A pre and posttest design was the most viable method to evaluate the inclusion of Internet and some of its applications as input in the learning of vocabulary in an English-as-a-foreign-language class. These applications, acting as linguistic input that provided definitions through different sources, together with the dialogical interactions constituted the treatment that was analyzed through the pre-test-post-test research design.

In a majority of pre-post-test analyses, data are analyzed comparing the treatments with respect to their posttest measurements. The statistical test of choice is generally an analysis of covariance (ANCOVA) in which the groups are compared in terms of change scores or gain scores. This procedure is the most appropriate choice under certain conditions according to Dugard and Todman (1995). Bonate, P.L. (2000) also offers a comprehensive analysis of pretest-posttest designs and summarizes the advantages and disadvantages of using different statistical methods within this particular design.

In the current work, as the research involved intact classes, randomization was just possible in terms of which of the seven groups were selected but not in the random assignment of students to different treatment groups. Considering that the condition or randomization is desirable in ANCOVA, that the present study violated the assumptions of equality of sample sizes, and the presence of some missing data, the use of statistical analysis that is not affected by those conditions is evident. This prompted me to use Multiple Linear Regression (MR) in order to account for the different variables in the study and to control for the effects of pretest on the model. Another reason to use regression lied in the fact, stated by Keith (2006) that ANCOVA

can be "conceived as a multiple regression analysis." In other words, "MR subsumes ANCOVA" (p. 155). He also states that "[o]ne potential advantage of using MR to analyze ANCOVAs is that it is possible to test for an interaction between the covariate and the treatment, whereas this is simply assumed for most ANCOVAs" (p. 159). In sum, the major objective of the MR analysis in this work was to find out if there was a significant relationship between posttest results (Lexical acquisition and possible retention) and each of the two treatments (Multiple web input modalities plus dialogical interactions or web input without dialogues). To analyze the data, the *Statistical Package for Social Sciences* (SPSS) was used.

A survey to obtain participants' background information was distributed. English-learning background, use of English (in academic or in authentic settings), and gender were tabulated and analyzed in order to find out whether these elements had any bearing on vocabulary gain. This survey together with the data from the ATTLS provided the basic variables that served as predictive or explanatory elements for vocabulary acquisition and retention. All these variables were included in the MR because it was expected that previous English knowledge, time spent using English, and learning styles (Connected/Separate Knowers) could have some bearing in the acquisition and possible retention of lexical units. What MR does is to determine whether the variables in the model have an effect on lexical acquisition (determined by the posttest). More specifically, the aim was to find out which of the treatments had a stronger effect on posttest grades, while the other variables served as control in order to improve the accuracy of the estimate of the effects of treatments on posttest grades.

In sum, the quantitative section of this work was designed to measure the degree to which students acquired and retained lexical items after a short-term treatment. To achieve this, the results in the posttest were used as the dependent variable in a Multiple Linear Regression model

controlling for pretest results (Plus other independent variables like ATTLS results and biographical data). The results in this section were expected to serve as evidence of the importance of meaning creation activities in the long-term retention of lexical units. Table 3 offers a visual summary of the hypotheses, data sources, and the methods of analysis.

Table 3

Quantitative Hypotheses and Analytical Methods

Hypotheses	**Data sources**	**Methods of analysis**
Hypothesis 1: Given the same amount of time devoted to the two treatments, learners will experience greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores.	Pre and posttests of vocabulary Surveys	Multiple Linear Regression
Hypothesis 2: Students who are connected knowers would obtain greater gains from dialogical interactions than separate knowers.	ATTLS Survey Results of posttest	Multiple Regression
Hypothesis 3: Students' individual characteristics and experience with English (English background knowledge, time devoted to English tasks, and language use) significantly affect test scores.	Biographical data survey Results of posttest	Multiple Regression

Threats

One particular threat to validity in vocabulary acquisition comes in the form of what is learned in the course through the intervention, and what is learned incidentally due to exposure to language in the media, conversations, readings, etc. To prevent the confounding effect of this variable (external sources), the **LFP** was used as a guide to determine which of the terms were

less likely to be learned incidentally. In that way, more of the less frequent terms could be used to determine vocabulary learning (in tests for example) while avoiding the more frequent terms that are more likely to occur in external sources.

Another expected threat comes from selection. As this was a cluster sample, groups were already formed so there could be differential selection (the results could be influenced by group differences). To minimize this, a survey asking students about background, courses taken in English, kind of school (bilingual, semi bilingual or public high school), reason for registering LM-1001, etc. was used to show how subjects could be similar in many aspects. The pretest was also used to compare the two groups in terms of similarities.

To eliminate the possibility of compensatory rivalry or equalization and experimental treatment diffusion, the researcher chose groups that had little contact with each other (different schedules accounted for this). As this study included a pre and a posttest, testing could pose a threat to validity. Careful attention to the elaboration of the tests was taken to establish valid instruments in both phases.

A series of confounding variables also posed a threat to the current research design. Among those I can cite exposure to a novel way to learn which could influence results, the instrument to test vocabulary acquisition, attention focus, self control in the use of the material, tendency to see inability to recall vocabulary as a sign of an item that was not learned without considering possibilities such as inability to retrieve it, formation of passive vocabulary, differences between recognition and usage, type of tasks, language level of participants, difficulties handling the media, contextual elements, individual differences, pedagogical aspects. All these elements should be taken into consideration at the moment of reaching conclusions and implications of this work.

Research Limitations

There are certain inherent limitations in following this kind of research. The most obvious one for those in search of generalizability and replicability is that because of its nature, this research is limited to a particular group. As this is a study with a small sample size and with minimum randomization (limited to the random assignment of groups to experimental and control), the possibility to generalize findings is seriously compromised. However, if the treatment seems to be effective and has practical significance, it could add validity to the results. As with the majority of studies on vocabulary, there is a serious limitation with respect to the vocabulary to be taught (who chooses it and how). This study is limited to certain low-frequency vocabulary, and this could represent just a partial sample of the kind of vocabulary students are exposed to on a daily basis in their life. However, working with the vocabulary included in chosen comic strips gave the researcher more control over what was going to be tested and certainly what was acquired during the development of the treatment.

As one of the major goals of this research was to discover the ways learners construct knowledge through dialogical interactions, the oral aspects of language of language were emphasized, particularly through oral prompts. However, as this is a group of beginners, it was not advisable to include oral input into the treatment because of the extra load that listening comprehension could impose on students. Furthermore, one limitation was the inability to include more naturalistic data, which could offer totally different results.

Chapter Summary

To address the different research questions, a mixed-method approach to research was used in this work. This approach is enclosed within a convergent framework that gives equal credence to both the quantitative and the qualitative components in the research. From a

qualitative standpoint, social constructionism becomes the basic epistemological foundation for the analysis of students' dialogical interactions and their construction of meaning. Elements of trustworthiness in the analysis were included in this section. Concerning the quantitative section, this work was based on a pre-test-post-test-control group design that used Multiple Linear Regression as the basic model of data analysis. This section also included aspects related to participants, data gathering methods, instruments, consent form statements, and data analysis procedures. The chapter ends with a brief mention of the research threats and limitations.

Chapter 4
Results

This chapter presents the most salient results ensuing from the analysis of the data. The general purpose of this analysis was to discover the ways in which foreign language learners construct meanings through their oral interactions when prompted by multiple Internet resources. Specifically, all five research questions were aimed at determining the conditions in which input modality and foreign language learners' interactions have an effect on lexical acquisition and retention. In order to answer the research questions, a mixed-methods research approach was used to explore how the use of multiple Internet resources plus/minus interaction (compared to a control group) influenced the acquisition and retention of new vocabulary, to examine what variables better predict novel lexical acquisition based on students' achievement gains on a vocabulary posttest, and to explore how learners construct knowledge in their social interactions. The analysis included Simultaneous Multiple Linear Regression to account for the different variables in the study and to control for the effects of the pretest in the model. The variables were chosen based on what the literature presents as potentially affecting language progress, to name: language exposure and experience and learning preference in connection to gender. The study also surveyed how students viewed the experience of using Internet resources to achieve vocabulary meanings through a Likert-scale post-survey. Finally, there is also a qualitative analysis of the data through the transcription and coding of the students' oral interactions (Transcription symbols in Appendix I).

Pilot Study (Instruments)

In order to test the feasibility of the vocabulary test and the Ways of Knowing Scale (ATTLS), a qualitative and quantitative pilot study of both instruments was performed. A group of 26 students enrolled in the course LM-1001 (Integrated English I) in the first semester of 2012

was used for this portion of the study. In the case of the ATTLS, the survey was distributed among the pilot participants (Table 4 provides more information on demographics), and they were asked to provide information as to what items needed clarification in terms of syntactic or semantic aspects. A qualitative examination of the comments suggested that the wording of some items could cause misunderstandings among English-as-a-foreign language students. Based on students' reports, it was recommended to better explain certain idiomatic expressions included in some items. For this reason, the researcher chose to provide explanations for the expressions "devil's advocate," "putting them [people] on trial," and "shoot holes." Aside from those items, the students understood the rest of the survey.

Concerning the second instrument, the Vocabulary Knowledge Test, it was piloted in order to assess the test performance and to select the most appropriate items to evaluate lexical acquisition (Appendix J). The pilot sample resembled the target audience in terms of English language background, age, and gender, and the pilot test was administered under the same conditions as the ones set up for the main testing administration (online, during the lab hour, during class time, under the teacher's supervision).

After the test administration, a quantitative item analysis was performed on all 45 items in the test. As the major purpose of the test was to analyze vocabulary acquisition, the goal of the quantitative item analysis varied significantly with respect to the traditional use of the analysis. For example, in terms of item difficulty, most test developers would discard difficult items with extreme p values (percentage values between 0 and .2). However, as the purpose of this test was to detect vocabulary gains in the short term, unknown lexical items (those whose meaning students could not identify) were the most appropriate ones for the final version of the pretest.

In the case of the Vocabulary Knowledge Test used in this study, items whose difficulty was below or equal to .46 were selected. This selection was based mostly on the criterion of unfamiliarity with the concept, as the point was to measure students' acquisition of novel terms after a short intervention. The Vocabulary Knowledge Scale tracks the early development of specific word knowledge (Paribakht & Wesche, 1993) and it assigns categorical numerical values to the items that range from 1 to 5. In the scale, and for the particular purpose of the assessment of the instrument, items that were marked 1 or 2 were classified as unknown to the students while items assigned 3, 4 or 5 in the scale were classified as known. As a result, all answers were transformed into binary combinations in the quantitative item analysis (Known items = 1; Unknown items = 0). After piloting the test and analyzing it, a highly difficult item, instead of being discarded, was used because it meant that such word was unknown for the test takers, a basic starting point in the present vocabulary acquisition study. In general, the reliability study on the pilot test determined that the odd-even r was .95, the full-length r equaled .97 and the alpha was .94. Out of 45 items in the initial test, 15 were discarded and 30 were kept for the final version of the pre and posttests (Appendix C).

Sample Demographics

For the purposes of the study, the researcher used intact classes from the English major at the University of Costa Rica. A total of 175 students were initially enrolled in the different sections of the course LM-1001 (Integrated English I) in the first semester of 2012. LM-1001 is an intensive English course for first-year English majors. From the 175 students enrolled, one group of 26 students piloted the vocabulary test and the ATTLS instrument (Table 4). The remaining six groups participated in the treatment and control groups (Two groups for each treatment group and two for control). However, only 107 students completed all the procedures

and their data were included in the final study. A total of 68 students (38%) either missed the pretest, the posttest or dropped out of the course.

Table 4

Demographic Information of Participants in Pilot Study (n=26)

Demographic Variables	*Frequency (n)*	*Percentage (%)*
Gender		
Male	16	61.53
Female	10	38.46
Age		
18	11	42.3
19	4	15.38
20	3	11.53
21	1	3.84
22	1	3.84
23	2	7.69
24	3	11.53
No answer	1	3.84
Years learning English		
0-5 years	5	19.23
6-10 years	8	30.76
11-15 years	12	46.15
17 years	1	3.84

Note: Totals may not be equal to 100% because of rounding and/or missing data.

All the students (100%) were English majors in their first year of studies. The slight majority of the sample was female (54.2%), while 45.8% were male students. Most of the participants' ages (67%) were between 18 and 20 years old and had been learning English for differing numbers of years. Table 5 offers a detailed breakdown of the participants' demographics.

Table 5

Demographic Information of Participants (n=107)

Demographic Variables	*Frequency (n)*	*Percentage (%)*
Gender		
Male	49	45.8
Female	58	54.2
Age		
18	29	27.1
19	20	18.7
20	18	16.8
21	7	6.5
22	8	7.5
23	3	2.8
24	6	5.6
25	3	2.8
26 and above	6	5.4
Years learning English		
0-5 years	38	40.0
6-10 years	27	28.0
11-15 years	29	30.0
16 years	1	1.0

Note: Totals may not be equal to 100% because of rounding and/or missing data.

Research Questions

For the purpose of exploring the ways in which foreign language learners construct lexical meaning through dialogical interactions, this study included five research questions. The questions led to a quantitative and qualitative analysis of the processes by which students acquire vocabulary in an ongoing meaning construction process. The quantitative portion of the research relies on Simultaneous Multiple Linear Regression (MLR) using posttest results as the dependent variable and a series of predictors or independent variables that include grouping, language learning experience, time dedicated to practice, and ways of knowing (learning preference) in

relation to gender. The following section includes the most significant results of the statistical analysis of the data.

Results by Research Questions

The analysis of all quantitative data provided answers to the following questions and their corresponding hypotheses:

1. Do dialogical interactions prompted by multiple input modalities from the Web (Google Web search, images, dictionary definition, and translation of the term) lead to differential acquisition of target lexical units than only multiple modalities without the dialogical component?
2. Considering students' learning styles measured through the ATTLS, is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?

All analyses were conducted using a .05 level of significance.

Research question 1. The first question was based on the premise that given the same amount of time devoted to the two treatments, learners would experience different gains from each of the treatments (Web modalities plus dialogical interactions and multiple definitional input from the Web without the dialogical component) after controlling for pre-intervention scores.

Initially, the scores of the students' pretests and posttests were calculated for all groups (Table 6). The test, assessed through the VKS, had a minimum score of 30 and a maximum of

150 points. The mean of the pretest for the Web plus Dialogue group was 61.89 (SD = 13.96) while the Web-only group obtained a mean of 63.42 and a standard deviation of 13.46. The Control group had a mean of 57.90 (SD = 14.00) in the baseline test.

Table 6

Test Results by Group

Group		*Pretest*		*Posttest*		*Difference*
		Mean	*SD*	*Mean*	*SD*	
Web Multimodality with Dialogical Interactions		61.89	13.96	84.47	19.16	22.58
N	Valid	36		36		
	Missing	5		5		
Web Multimodality without Dialogues		63.42	13.46	80.28	15.37	16.86
N	Valid	33		29		
	Missing	1		5		
Control Group		57.90	14.00	56.81	14.04	-1.09
N	Valid	29		26		
	Missing	3		6		

Note. The total possible score was 5 (VKS level) x 30 (number of target words) = 150

In terms of the posttest scores, the mean of the Web plus Dialogue group was 84.47 (SD = 19.16). The posttest mean of the Web-only group was 80.28 (SD = 15.37). The Control group mean was 56.81 (SD = 14.04). By analyzing both sets of means, scores increased after each treatment (gain of 22.58 in the Web plus dialogues group and a gain of 16.86 in the Web-only group). The Control group showed a decrease between pre and posttest mean scores (1.09).

In order to test the first hypothesis that states that "given the same amount of time devoted to the two treatments, learners would experience greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores," a Multiple Linear Regression (MLR) was

conducted to compare the groups' marginal mean differences. The posttest scores were used as the criterion in the different iterations of the regression. The first multiple regression was computed to show how the variable "Results of pretest" was related to posttest results and to compare treatment and control groups. This comparison was achieved within the MLR model by recoding all groups into dummy variables. The first multiple regression model with three predictors produced $R^2 = .677$, $F(3, 78) = 54.60$, $p < .001$, indicating that the independent variables accounted for 67% of the variance in posttest results. Table 9 presents the results of this multiple regression analysis (Model 1). Each of the predictor variables was statistically significant ($p < .001$) with the exception of the Web group that was significant at the 0.05 level. As indicated in the table, the variable "Results of pretest" had a significant predictive ability, demonstrating that for every one-unit increase in pretest, there is a .82 increment in posttest results. Besides, the marginal mean in Treatment group B (Multimodality without dialogues: Variable "Web" in the model) was 6.26 units lower than the mean in Treatment group A (Web plus dialogues). This difference was significant (Treatment A, marginal mean = 34.69). In the case of the comparison between the Web plus dialogues group and the Control group, the latter had significantly lower scores (24.40) than the Treatment A group. The difference in means between Web and Control is significant too. In fact, the Control group mean is -18.13 units with respect to the Web-only group. These results indicate that as expected, pretests and posttests are significantly correlated and that there is a significant difference between treatments (Web-only and Web plus dialogues groups) and between both treatment groups and the control group. The results allow us to reject the null hypothesis and to support the idea that there are greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores.

Research question 2. This question was also analyzed through the use of MLR. In order to find out whether students' learning styles measured through the ATTLS produced a difference in the gains of target words, the means of the survey items referring to the two different constructs (Connected Knowing and Separate Knowing) were computed and used as variables within the multiple regression model. As the Control group did not fill out the ATTLS, it was left out of the model. Table 7 shows descriptive statistics on the variables in model 2.

As the major purpose of this study consisted in determining the extent to which dialogical interactions aided students in the acquisition and retention of lexical items mainly because of the meaning construction process that takes place in dialogue, it was hypothesized that, by applying a measure on ways of learning, I could come up with a categorization of students' learning preferences. As such, students who were connected knowers would obtain greater gains from dialogical interactions than separate knowers who would benefit from alternative learning processes. In order to test the hypothesis, the scores of the ATTLS were included in the Multiple Regression Model used for the general analysis of the present data.

Table 7

Descriptive Statistics and Correlations

Variable	*Mean*	*SD*	*Correlation to Posttest*
Results of pretest (N = 52)	63.17	13.88	.675*
Web (N = 52)			-.249**
ConnectedLearningScore (N = 52)	5.44	.843	-.215 ns
SeparateLearningScore (N = 52)	4.75	.827	-.205ns

Note. * p = .000, ** p < .05, ns = nonsignificant

As it can be attested in Table 9 (Model 2), the results of the Multiple Linear Regression suggest that with four predictors, Web, Pretest, Connected Knowing, and Separate Knowing, the regression model was statistically significant: $R^2 = .534$, $F(4, 47) = 13.48$, $p < .001$ (As the ATTLS was administered only to the Treatment Groups, the Control group is left out of the regression). In this case, as expected, a significant proportion of the total variation in posttest scores was predicted by pretest. In other words, a student's score on the pretest is a good predictor of their posttest grade as confirmed by the fact that the unstandardized slope (.825) is statistically different from 0 ($t = 6.33$, $p < .001$). This means that with every one unit increase in pretest, posttest scores will increase by approximately .83 units after controlling for Ways of Learning (Connected Knowing, Separate Knowing). Additionally, Treatment group B (Web without dialogues) remained statistically significant and its marginal means suggest that those in the Web group had a score 8 units lower than those in the Web plus dialogues group. As a final remark, the two variables on Ways of Knowing were not statistically significant. Based on these results, the Connected and Separate Knowing measures appear to offer little additional predictive power beyond that contributed by the other two variables in the model.

Considering that the results on ways of knowing was not significant, that the ATTLS is a measure of learning preference in which both constructs are independent of each other, and that the measure has in some cases been related to gender specific preferences in ways of learning, it was relevant to include the gender variable in the model to notice any variation in the results. The inclusion of the gender variable in relation to both Connected Knowing and Separate Knowing scores as separate Dependent Variables produced the descriptive statistics provided in Table 8.

Table 8

Ways of Knowing and Gender Descriptives

Gender	*Connected*		*Separate Knowing*	
	Mean	*SD*	*Mean*	*SD*
Male (N = 28)	5.13	1.16	5.01	.79
Female (N = 34)	5.49	.79	4.47	.78

As it is shown in Table 8, the female group was slightly larger than the male group. Also, there was a slight difference in the means that showed that females did better in the connected knowing section of the survey (.36 difference in means) while males showed a slight gain in the separate knowing elements (.54 difference in means).

The relationship between gender and ways of knowing indicated what previous studies had already discovered: males tend to be more separate knowers while females prefer connected ways of knowing. In fact, when gender (Male coded as 1) was regressed on both constructs (Connected Knowing and Separate Knowing) separately, the regression results turned out to be nonsignificant when the Male variable was regressed on the Connected Knowing variable (Model 3), but significant in the case of Separate Knowing ($R^2 = .106$, $F(1, 60) = 7.089$, $p = .01$) which means that 9.1% of the variance in Separate Knowing can be explained by gender (Model 4). In fact, the marginal mean for males is .53 units higher than the mean for females in the Separate Knowing construct ($t = 2.66$, $p = .01$). These results show a relative advantage of male students in the separate knowing construct. Is this advantage significant? Is this difference in means significant with respect to the dependent variable (Posttest scores)? In order to test the level of significance, the difference in scores (change scores or simple difference scores) were computed and included in a One-Way Anova. The dependent variables used included pretest and

posttest scores, the Ways of Knowing variables (Connected Knowing and Separate Knowing), and the changescores variable (Posttest minus Pretest) analyzed with respect to gender and group. As some of the results in the Anova analysis showed significance, a post hoc test was computed to determine if the differences were significant. The Bonferroni test was used to compare each of the groups (separated by gender) with the pretest, posttest, ways of knowing, and the change scores. No significant differences were found between males and females with respect to the ways of knowing variable, disconfirming the hypothesis for this section (See Appendix K for results of Anova).

Research question 3. This question was worded as follows: "Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?" To answer the question, the scores of all the different variables accounting for English knowledge background, including language use, and time devoted to English language tasks were added and integrated into two separate variables, i.e. "English hours" (time spent on homework, exams, listening to others or to music, reading in English, watching video, talking to friends or tourists) and "Experience" that included time living in an English-speaking country, using English abroad, and knowledge of an additional foreign language. It was hypothesized that students' individual characteristics and experience with language (English background knowledge, time devoted to English tasks, and language use) significantly affected test scores, in other words, that these variables would have a positive effect on lexical acquisition and retention.

A Multiple Linear Regression (model 5) was conducted to evaluate how well the English language variables predicted vocabulary acquisition and retention as measured in a posttest assessment. In this case, these two predictors (English hours and Experience) were added to the

already tested model that controlled for Results of the pretest, the Web without dialogues group, and Control group. The linear combination of these measures was significantly related to the posttest measure; in other words, the overall multiple regression was statistically significant: $R^2 = .67$, $F(5, 76) = 31.96$, $p < .001$, indicating that the different variables accounted for 67% of the variance in posttests. Table 9 includes the relative strength of the individual predictors. Most of the coefficients showed positive integers: Intercept ($B = 34.35$, $p < .001$), Results of pretest ($B = .816$, $p < .001$), including English Hours, and Experience. The remaining unstandardized coefficients, on the other hand, were negative, and only three of the six indices were statistically significant ($p < .001$).

As expected, the pretest scores and the Control group remained statistically significant in the model. In the case of the former, this significance indicates that for every one-unit increase in pretest scores, a .81 increment in posttest results occurred. In the case of the Control group, the significance in the results shows that there are statistically significant differences in the marginal means of the control group and Treatment A. In the case of Treatment B (Web without dialogues), its marginal mean remained 6.25 units below that of Treatment A but it was non significant ($p = .53$). The control group remained 24 units below group 1 (Web plus dialogues). In the particular case of Treatment A, and as the regression included dummy coded variables, the intercept or constant refers to the expected mean value when all other variables are held constant. In the final model, the mean value for the reference group (Web plus dialogical interactions) was 34.35 while the mean values for the Web and Control groups were 28.11 and 10.01 respectively.

Table 9

Multiple Linear Regression Results

	First model Y = Posttest (std.err.)	Second model Y = Posttest (std.err.)	Third model Y = CK (std.err.)	Fourth model Y = SK (std.err.)	Fifth model Y = Posttest (std.err.)
(Intercept)	34.694* (6.247)	57.202** (18.457)	5.497* (0.168)	4.476* (0.136)	34.352* (7.856)
ResultsPretest	0.825* (0.94)	0.825* (0.130)			0.816* (0.101)
Web	-6.263** (3.103)	-7.922** (3.547)			-6.239 (3.147)
Control	-24.402* (3.326)				-24.296* (3.378)
EnglishHours					0.030 (0.341)
Experience					0.394 (1.723)
ConnectedLearnScore		-1.699 (2.153)			
SeparateLearnScore		-2.612 (2.168)			
Male			-0.358 (0.251)	0.537** (0.202)	
R-square	0.677	0.534	0.033	0.106	0.678
Adj. R-square	0.665	0.495	0.017	0.091	0.657
R.S.E	11.903	12.614	0.98164	0.79040	12.053
F	54.606 (p<0.001)	13.483 (p<0.001)	2.040 (p=0.158)	7.089 (p=0.010)	31.967 (p<.001)
Df	78	47	60	60	76

Note: CK = Connected Knowing, SK = Separate Knowing, *p < .001, **p < .05

The regression equation with all five variables (Results of pretest, Web, EnglishHours, Experience, and Control) accounted for a significant amount of posttest results; however, time

spent on English tasks and language experience were not statistically significant predictors, therefore disconfirming the basic hypothesis of this section but giving credence to the differences among groups (In terms of both treatments and also in relation to the Control group).

Qualitative Analysis of Questions 4 and 5

The statistical analysis of the data showed that the pedagogical intervention that included Web tools plus dialogical interactions was significant; in other words, the means in treatment A remained above those in the other groups in all models. This is only part of the whole picture. What elements in these interactions contributed in the construction of meaning? How do students go about this construction? In order to understand the ways in which meaning is created in dialogical interactions, a qualitative analysis of recorded conversations was performed. The data were coded using Gunawardena, Lowe, and Anderson's (1997, 1998) model for the analysis of the social construction of knowledge, and the results of such operation are described below. Also, students were asked about their preference for a particular Web resource for the search of meanings of unknown lexical items (Appendix F). To search for the definitions of terms, students were given access to a Webpage that included all the target words linked to different referential resources: Google search of the term, a Google image search of the term, a Dictionary.com definition, or a Google translation of the vocabulary item. The results of the survey are also included in this section.

Research question 4. This question was qualitative and mainly descriptive. The purpose was simply to determine which of the search options offered in the Webpage seemed more appealing for students in their efforts to find the definitions of words. The research question was stated thus: Do learners express a preference for a particular input modality from the Web to learn vocabulary? In order to answer this question, a basic Likert-scale questionnaire was added

at the end of the Webpage. Students answered the question right after searching for definitions online. The idea of preference was linked to usefulness in understanding the meaning of words. The Webpage offered four different alternatives for students to find the meaning of different lexical items, to name: Google search of the term, Google images, Dictionary.com definition, or a translation into Spanish from Google translate. From among those options, students were asked to record their preference of Web resources as *Very useful, Useful, Of little use*, or *Not useful*. The results of the survey are presented in Table 10. Fifty-three participants of the study answered the question (those in the treatment groups who used the Webpage).

Table 10

Number of Answers of Usefulness of Links for Understanding Meaning

Webpage Links	Very useful (1)	Useful (2)	Of little use (3)	Not useful (4)	Rating Avg.	Rating Count
Google	11	17	10	10	2.40	48
Google images	4	14	17	14	2.84	49
Dictionary.com	29	16	5	3	1.66	53
Google translate	29	20	3	1	1.55	53

Note. Numbers in parentheses refer to weighted value

Values in each choice were weighted in order to calculate the rating average. These values (1 to 4) though incremental in nature are simply used for determining the tendency towards particular choices. For example, the different choices were weighted in this order: Very useful = 1, Useful = 2, Of little use = 3, and Not useful = 4, but the order could have been reversed without affecting the outcomes. The rating average resulted from the multiplication of each respondent count (frequency) with the weighted factor. The results of this operation were later

added and finally divided by the number of responses in each item. The weighted values in two resources (Dictionary.com and Google Translate) reflect a slant towards the "useful" rating (Closer to weight value 2 than to 1). To a lesser degree, students' answers show that a basic Google search of the term falls to the right of "Useful" but still within this category (2.40). In the case of Google images, students' choices show their negative evaluation of this resource as a tool for finding the meaning of vocabulary items (the weight of 2.84 is slanted towards the "Not Useful" category. See Table 10). The percentages in each category are presented in the following figure:

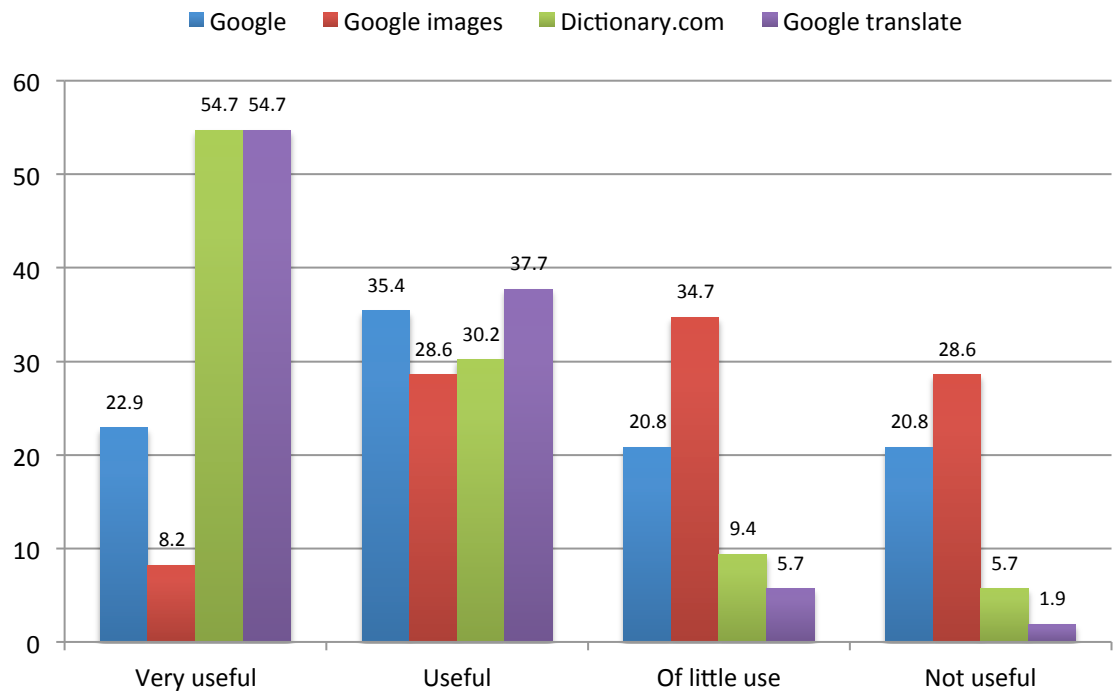


Figure 6. Students' appraisal of usefulness of Web resources to find definitions

As shown in Figure 6, students find Dictionary.com and Google Translate very useful in their efforts to find the meanings of words. On the contrary, a basic Google search of the term and Google images were appraised negatively.

Research question 5. Based on the analysis of transcribed oral conversations, how do learners construct meaning through their dialogical interactions? To answer this question, it was necessary to thoroughly analyze the language used by the participants in their recorded interactions. The recording sessions included 9 different groups of different sizes (3 to 5 students each) for a total of 39 participants. The sessions lasted approximately 25 minutes or less for a grand total of 167.44 minutes of oral conversations that were later transcribed and coded. The total number of types produced during the recording sessions was 1949. These types come from the 22689 tokens transcribed and analyzed (Table 11).

Table 11

Lexical Frequency Profile of Participants in Dialogues (Cobb, 2004)

	Families	Types	Tokens	Percent
K1 Words (1-1000)	486	747	14159	62.40%
Function:	….	….	(9342)	(41.17%)
Content:	….	….	(4817)	(21.23%)
> Anglo-Sax =Not Greco-Lat/Fr Cog:	….	….	(2998)	(13.21%)
K2 Words (1001-2000)	186	242	1112	4.90%
> Anglo-Sax:			(571)	(2.52%)
1k+2k		….	….	(67.30%)
AWL words (academic):	74	85	283	1.25%
> Anglo-Sax:	….	….	(58)	(0.26%)
Off-List Words:	?	875	7135	31.45%
	746+?	1949	22689	

It is interesting to point out that the number of types when compared with the total number of tokens produces a low type-token ratio, which is expected considering the level of the students in this research (Beginners).

The major point of the qualitative analysis of students' interactions was to point out the ways in which students construct the meaning of specific lexical items. As students were exposed to the meaning of the words through a Webpage specifically designed for that purpose, it was expected to find instances of interactions in which the target words were discussed among the participants. Besides, students were provided with comic strips that contained the target words. Based on the input received and the subsequent discussion of the comic strips, students developed dialogical interactions that contained a significant number of instances of those lexical items in their conversations. These semantically related incidents in their conversations increased the frequency of exposure of the new terms and allowed in many instances to deal with other areas of vocabulary acquisition like pronunciation. Table 12 provides a list of the target words produced by the students in their interactions and a frequency count.

Table 12

Frequency of Use of Target Words in Students' Dialogues

LEXICAL ITEM		LEXICAL ITEM		LEXICAL ITEM		LEXICAL ITEM	
Acumen	32	For good	4	Nourishing	*	Snooker	37
Booze	33	Groceries	*	Outpatient	17	Spasm	29
Bully	84	Hindsight	55	Placement	*	Splurged	59
Catawampus	12	Lazy bums	22	Playing catch	26	Swanky	39
Dare	22	Leather-bound	42	Prank	58	Swing	33
Degree	*	Liable	30	Royalties	32	Thirtysomethings	32
Disclaimers	41	Lollygagging	10	Shenanigans	11		
Fiber	*	Lurch	28	Sighing	34		

The coding scheme was based on Gunawardena et al.'s scale for social construction and their interaction analysis model for examining social construction of knowledge (1997,1998). Even though the model was designed for computer conferencing, the different stages in the construction of knowledge can clearly be applied to other forms of interaction. The model subdivides knowledge construction into five different phases:

1. Sharing/Comparing of Information

2. The Discovery and Exploration of Dissonance or Inconsistency Among Ideas, Concepts or Statements
3. Negotiation of Meaning/Co-Construction of Knowledge
4. Testing and Modification of Proposed Synthesis or Co-Construction
5. Agreement Statement(s)/Applications of Newly-Constructed Meaning (Gunawardena et al., 1997, 1998)

For a complete breakdown of the interaction analysis model for examining construction of knowledge, refer to Appendix L.

The Interactional Analysis Model and the Tool for Testing Constructivist and Social-Constructivist Learning Theories are clearly in line with Vygotsky's position concerning cultural and social elements in learning. As Gunawardena, Lowe, and Anderson (1997) point out, collaboration can be seen in terms of "situated activity, mediating devices, higher and lower mental functions and the zone of proximal development" (p. 408). Gunawardena et al. also state that Vygotsky's theory is key to understanding group interactions because of the connections between mental activity and the cultural and social contexts that affect it. Their model posits the idea of students' learning mediated by others, and in the present study, by the computer. In their model, students' movement from one phase to the other is analogous to the Vygotskyan distinction between lower and higher mental functions (Vygotsky, 1978). In the group interaction and the proximity of others, meaning creation and learning take place whenever learners move along the successive stages of the model. Computers and the utterances of others play a role as mediators in individual thinking too.

As interaction is at the core of the analysis, it is assumed that in the construction of knowledge, the participation of different individuals is essential for the creation of meaning. In

such case, a socio-cultural view of interaction is expounded and promoted in this research in accordance with Ellis and Fotos' definition of interaction as "a social practice that shapes and constructs learning." In fact, interaction is "the actual site of learning"(p. 21). In other words, through interaction, participating individuals collaborate in the construction of meaning through their active engagement in conversation.

To assess knowledge construction, it was fundamental to establish a constructive learning task in which collaboration and negotiation of meaning were present. As the participants had similar level of language proficiency, they were provided with comic strips that contained the target words whose meaning they had already encountered in the Webpage. The purpose of the conversations was to allow students to share their understanding of the terms and share meanings. A series of questions were added as aids in the discussion (See Appendix E). What follows is a summary of the most relevant results obtained from analyzing the different units of meaning that could be a single statement or even paragraphs, but in most cases the entire interaction was used as the unit of analysis. The Qualitative Research Analysis Software, *Dedoose*, was used in the analysis of the transcripts because of its capabilities in mixed-research approaches as it allows the integration of both qualitative and quantitative components.

Phases in social construction

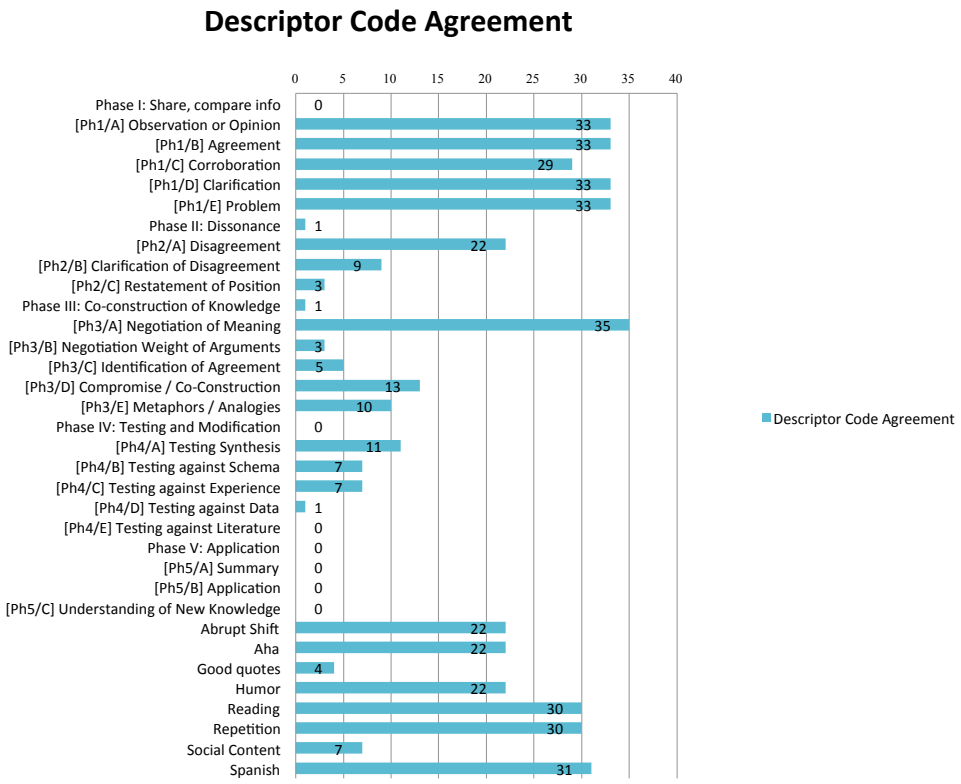
Students' interactions were thoroughly coded in order to find patterns in their conversations and to identify the construction process that they go through in their attempts to understand not only the general meaning of the comic strips under discussion but also the semantic content of the target words. Several interesting facts emerged from the analysis of the participants' oral interactions.

By analyzing the different codes and their relationship to the different descriptors (Personal and numeric data of the participants), it becomes clear how the majority of the students' contributions took place in the first three phases of the interaction analysis model (Table 13).

A considerably large number of interactions occurred at Phase I: Sharing / Comparing of Information. It is important to notice, however, that Phase 3, A: Negotiation or Clarification of the Meaning of Terms, has the highest number of instances, and it is necessary to point out the considerable number of areas of disagreements (Ph2/A) which are the springboard for the negotiation of meaning.

Table 13

Frequency of Descriptor/Code Agreement



In the following excerpt, there is an example that comprises the first three phases of knowledge construction. In this portion of the dialogue, students are discussing a comic strip in

which two ladies are walking on the street. In the first frame appears the Grand Hotel, in the following Ed's Snooker Club. One says to the other: "That's where Andy and I spent our wedding night. --Oh, the Grand, very swanky. --No, not the Grand. Next door." (See Appendix E for source.)

Excerpt Team 2 (Lines 565 to 600)

PRI1P: What's snooker?

MAC1I: Snooker is the game related like pool.

PLR: [Yeah] like that.

NAT1M: Like pool but in another another balls.

PLR: [A variety, a variety of pool.]

PRI1P: [Ahhhh! Club] Uh, huh. Snooker. Uh, huh.

MAC1I: [But] the game has um a different order of the pool because in pool you put the ball in the buckets by colors [PRI1P: uh, huh.] but in this game by number.

PRI1P: Ahhh!=

PLR: But it also has uh, red balls.

MAC1I: So, why-

PRI1P: [So this] this is funny.

PLR: [That's different.]

PRI1P: The, the second one something about the Swanky Hotel and blah blah-

MAC1I: [That's why- Yeah. That's why she's making fun of that.]

NAT1M: [o Yeah o]

MAC1I: [o Yeah o] because in the first image they see [] like a swanky hotel-

PRI1P: [Ah no, I can't understand, again, again] How does it compare to the Snooker Club? Wow, what, do you told me something, but again, again.

NAT1M: ((Indistinct.))

PLR: How does it compare to the Snooker Club?

PRI1P: [Uh huh? uh huh?] How? how? How?

MAC1I: Umm it's maybe it's compare like the Grand next door and you, you can read like the irony of the girl because [] she says the Grand, very swanky hotel. No, not the Grand. Next door.

NAT1M: But it's because she (xxx)

PRI1P: Mmm

MAC1I: She's always making fun of that because the first image [PRI1P: Mm hmm] she thinks she wa she had her night, she spent her night on the Grand Hotel [PRI1P: Mm hmm.], but no.

PRI1P: Hih, hih.

MAC1I: It wasn't there.

PRI1P: En un cuchitril. Hahaha. ((Spanish for old rundown place.))

MAC1I: [(But) at Ed's, yeah, like-]

PLR: (xxx)

PRI1P: $En un, en un. En un hueco.$ Uh, huh. ((Literally: In a hole.))

In this excerpt there is an ongoing negotiation of meaning concerning lexical items like snooker and swanky, and more general comprehension interactions as those related to the understanding of the comic strip. It is always encouraging to find expressions of mutual understanding like the “Ahhh’s” and “Uh huh’s” in PRI1P’s utterances. However, there is also dissonance in the middle of the conversation, as one of the students does not understand the meaning of the story. This uncertainty in the conversation requires further clarification provided by the other students. The co-construction is successfully achieved when the student who asked for clarification understands the irony. The students co-construct meanings and accurately conclude that it is not the same spending one’s wedding night in a swanky hotel than in the “cuchitril” (dirty, small place) like Ed’s Snooker Club.

With respect to the movement along the different phases of social construction, there are specific trends in the participants' interactions that show an obvious inclination towards the first three phases. Most contributions were coded as Phase 1: Sharing/Comparing of Information. For example:

Excerpt Team 8 (Lines 3055 to 3090)

3055. LCH4O: I don't know if we can speak (xxx).

3056. JSR4K: Your turn KCQ4M.

3057. KCQ4M: What, this?

3058. LCH4O: Yeah (xxx)

3059. JSR4K: [No, this.]

3060. FEL4I: [(xxx)]

3061. KCQ4M: Ah ok. Did you?

3062. JSR4K: No this=

3063. LCH4O: I can read the sir if you want to. ((The part of the man in the comic strip.))

3064. KCQ4M: Ok. I am looking for a birthday gift for my son...

3065. LCH4O: Yes, Ma'am!

3066. KCQ4M: [Yes, Ma'am!]

3067. ((Giggles.))

3068. KCQ4M: How about-

3069. LCH4O: [How about-]

3070. ((Giggles.))

3071. KCQ4M: You read!

3072. LCH4O: How about a work-related gift?

3073. KCQ4M: Hmmm... Good idea! Let's see... Do you have a leather-bound directory of companies near the beach that hire lazy bums?

3074. JSR4K: I remember what is leather-bound.

3075. MAY4T: Yeah, it's a, a book, uh (from leather) leather.

3076. FEL4I: [Leather-bound is like that has a leather cover.]

3077. JSR4K: [Cover leather.] Yes.

3078. MAY4T: Uh huh.

3079. LCH4O: Lazy-

3080. JSR4K: Uh lazy bums. Lazy bums ((Pronounced with U.)) are like people [] who are really lazy, heh, heh, heh!

3081. FEL4I: [that are (xxx)] Idle. Yes. ((Idle pronounced with short i.))

3082. JSR4K: Yes, $ I was searching about that word and I put in images, uh, lady bums, and the first image was a Homer Simpson image. $ Like this (xxx) in the couch. Ha, hah, hah.

3083. Student: ((Inaudible speech in background.))

3084. FEL4I: ((Chuckles.))

3085. LCH4O: What is lazy bum? ((Unaware of the previous exchange?))

3086. JSR4K: Like uh lazy people.

3087. LCH4O: Ahhh. Ah ya. Yeah, yeah, I remember.

3088. MAY4T: ((Mumbling, like reading from comic strip.))

3089. JSR4K: And: ((Clears throat. Reading question.)) "A leather-bound directory ((mumbles)) Maybe clothes are made of (xxx) ((Leather)) and shoes. Eh! Hih, hih, hih.

3090. LCH4O: Heh, heh, heh.

In the previous excerpt, we can find all the different elements of phase I: Statements of observation or opinion (lines 3056, 3071), Statements of agreement (lines 3058, 3075, 3077), Corroboration of examples (3076-78), Asking and answering questions to clarify details (lines 3057, 3085), and finally Identification of a problem (line 3055).

In the case of Phase 2, participants in the different groups showed a proclivity to avoid disagreements and when they came up, they were overlooked or quickly resolved without major discussion like in this example:

<u>Excerpt Team 8 (Lines 3129-3138)</u>

JSR4K: We recorded your swing. How it- how it looks? How it look? Eh How's it look? Eh Much better. It's now somewhere between a lurch and a spasm.

LCH4O: o Spasm. o Spasm is like uh something in the back. (I get my) back-

JSR4K: [Yes (xxx)]

FEL4I: [Some muscular pain-]

KCQ4M; No.

JSR4K: It's a muscular pain. Not always in ((the back.))

FEL4I: Muscle, muscle pain.

KCQ4M: [o Espasmo. o]

JSR4K: o Muscle pain. o

When KCQ4M shows his disagreement with LCH4O's definition of spasm, JSR4K corroborates FEL4I's example and the disagreement is resolved in the repetition at the end that serves as a resolution or a tacit agreement on the definition of spasm.

Respecting Phase 3, there are 261 code applications to elements related to the negotiation or clarification of the meaning of terms. This is an expected result considering that the task was focused on lexical identification and clarification of meaning. Among the many instances of negotiation of meaning, this is one that shows the co-construction of the meaning of *bully*:

<u>Excerpt Team 9 (Lines 3256-3276)</u>

AZS4B: Yeah, but what is the meaning of bully. I, I rem-

MFZ4P: [bully]

CAR4D: [Those kids who, who hit- who beat the, the little kids.]

MIO4S: [the little kids]

AZS4B: Dh, ahh ok!

MIO4S: Or, or the: eh, when you, em, say bad,=

CAR4D: things to=

MIO4S: bad things (.)

CAR4D: another

AZS4B: [to someone]

MIO4S: for, for I don't know, em, um-

CAR4D: It's like those common case in-on on the United States ↑

MIO4S: Yes!

CAR4D: that people get the other people into their lockers. ↑

MFZ4P: [Ahhh yeah!]

AZS4B: [(xxx) in the school or in-

CAR4D: Yes on the (trash).

MFZ4P: Like in the movies. Hah, hah.

CAR4D: Yes! Like in the m- that, that's a bully.

MFZ4P: [Uh huh.]

AZS4B: Mmm hmm. ((Soft giggles.)) Ok.

Phase III also offers examples of how students make use of similes and analogies to construct the meaning of novel lexical items. The transcribed conversations are full of instances of the use of these figures of speech so typical in the description of unknown elements. The following are examples of how students try to figure out the meaning of certain terms by using analogies or similes:

- *Badminton*: It's similar to tennis. Uh huh. Es como con una cestita (xxx). (Team 2, Lines 1684-85) [It's like with a shuttlecock.].
- *Bully*: Como los güilillas de la escuela. (Team 4, Line 1383) [Like the kids in school. "Güilillas" is a Costa Rican term].
- *Leather bound*: Like Bibles. (Team 2, Line 506).
- *Liable*: Liable is like, uh? responsible. Ok. (Team 1, Line 428)
- *Swanky*: Swanky is "pipi." (Team 1, Line 215) ["Pipi" is Costa Rican slang for swanky].

- *Booze*: Like whiskey, "Cacique." (Team 4, Line 1256) ["Cacique" is the brand of a traditional Costa Rican liquor made of sugar cane].
- *Pranks*: Like jokes, like in Halloween or something, like a monster. (Team 5, Line 2097)
- *Snooker*: Like pool. (Team 1, Line 222)

As it is typical in knowledge construction, different phases can occur at the same time and students may use different strategies concurrently, like in the case above in which besides analogies, students also use code mixing.

Elements in Phase IV are scarce in the students' interactions. In fact, most of the excerpts related to this phase deal with the testing of co-construction against personal experience. The topic of bullying was the one that had the most appeal and the one that prompted students to connect the semantic understanding of the term to their personal life. Fourteen excerpts related to bullying are coded as Ph4/C (Testing against personal experience).

A particularly interesting result in this section (Phase IV) came up in the conversation established by Team 4 in which they make a connection between the main topic of the comic strip (Gen @) and their personal knowledge of technology. This connection is an example of a synthesis tested against "received fact" or even their own cognitive schemata:

<u>Excerpt Team 4 (Lines 1250-1290)</u>

> AND: ((Reading a different comic strip.)) [So thirtysomethings are Generation X and we're Gen Y. And today's babies will be Gen Z. What comes after that? I guess they're gonna have to go to the shift key. Gen @! I like it.]
>
> NAT1M: [Hih, hih, y' know, hih, hih.]
>
> RAN1Q: [Yeah, I would-
>
> MAJ1J: [Barney.] ((Probably referring to Barney from the Simpsons. A reference to the previous discussion on booze.)) This one. [This one.]

NAF1N: Ok, thirtysomethings are Generation X and we're Gen Y. And today's babies will be Gen Z.

MAJ1J: [Heh, heh, thirtysomethings.]

AND: [Y, y.] [Z]

RAN1Q: [Z]

NAF1N: [G]

RAN1Q: [after that] [What is Shift key?]

AND: Shift key.

RAN1Q: What is Shift key?

AND: Key.

RAN1Q: Key, yeah.

AND: Este, como la llave, ((Literally "door key")) como, hhh, shift key es

MAJ1J: Shift, I don't know.

NAF1N: Heh, heh, heh. Do you understand?

AND: No! I don't understand!

NAF1N: [The] people today-

AND: A lo tecnológico. ((Technology wise.))

NAF1N: is, is, eh

MAJ1J: Ahhh, heh, heh, heh.

RAN1Q: (They change over) the generations.

AND: Generation "arroba." ((Generation ampersat, @))

NAF1N: [arroba.] ((Giggles.))

RAN1Q: The name heh, heh, heh (Varas). ((Just kidding.))

MAJ1J: Generation Facebook. ((Giggles.))

NAF1N: Oh, yeah. Heh, heh, heh.

RAN1Q: Yeah, (like) Facebook.

((Indistinct voices.))

MAJ1J: The kid is talking about different generation. When were [] the "thirtysomethings" born?

RAN1Q: [AND! Can you spell your name? Arroba ((@)) N Heh, heh, heh D R

AND: D R-

NAF1N: [Maybe, maybe, my name is NAT1M, slash, hyphen

AND: Slash, hyphen, dot com.

MAJ1J: Yeah. ((All laughing.))

AND: If you want to know about me, (let's) visit this site.

MAJ1J: [My email is-] ((Giggles)).

The way in which students expand the content of the comic strip and get the gist of its humor is simply amazing. Also, their understanding of the different humorous possibilities that they created, the connections to present-day technological advances, and their influence on their identities lead them to identify different possibilities of how their digital personas can be addressed in future generations.

Moving up on the social construction of knowledge model used in this work, it is evident that the “higher” that it gets, the less coding that takes place. In fact, the co-construction of knowledge that takes place during the dialogical interactions of the students does not move beyond Level IV. Table 14 portrays the ways in which each of the participants actively participated in the social construction of knowledge and how the coding at higher levels tends to decrease systematically.

Table 14

Number of Codes Applied for Each of the Participants

Participants	Phase IV: Testing and Modification	[Ph4/A] Testing Synthesis	[Ph4/B] Testing against Schema	[Ph4/C] Testing against Experience	[Ph4/D] Testing against Data	[Ph4/E] Testing against Literature	Phase V: Application	Total Codes Phases 1-5	Variety of Codes in Phase 1 to 5
STE1T_Male_Team1.docx			2	1	1			100	13
SMM4W_Fem_Team7.docx								17	8
SAU1R_Male_Team3.docx								106	10
RAN1Q_Male_Team4.docx		1						53	9
PRI1P_Fem_Team2								29	7
PAUI0_FEM_TEAM1.docx			1					71	14
PAB4V_Male_Team6.docx								49	8
NAT1M_Fem_Team2		1	1					46	11
NAF1N_Fem_Team4.docx		2		3				68	10
MON1L_Fem_Team3.docx								71	9
MNR4R_Fem_Team6.docx								23	7
MIO4S_Male_Team9.docx								13	6
MFZ4P_Fem_Team9.docx								20	7
MEL4U_Fem_Team5.docx								27	8
MAY4T_Fem_Team8.docx		1						23	7
MAL4Q_Fem_Team5.docx								20	7
MAJ1J_Fem_Team4.docx		2	1	2				67	11

Participants	Phase IV: Testing and Modification	[Ph4/A] Testing Synthesis	[Ph4/B] Testing against Schema	[Ph4/C] Testing against Experience	[Ph4/D] Testing against Data	[Ph4/E] Testing against Literature	Phase V: Application	Total Codes Phases 1-5	Variety of Codes in Phases 1 to 5
MAC1I_Male_Team2								92	9
LUI1H_Male_Team1.docx		3		5				85	14
LCH4O_Fem_Team8.docx		1						28	7
KCQ4M_Fem_Team8.docx								22	7
KCG4N_Male_Team7.docx								22	8
JUA4L_Male_Team6.docx								35	7
JSR4K_Male_Team8.docx		1	1	1				42	10
HEL4J_Fem_Team6.docx								25	8
FEL4I_Male_Team8.docx								22	7
EVL4H_Male_Team5.docx		2						20	7
EST4G_Male_Team7.docx								24	6
EDW4F_Male_Team7.docx								13	3
DAN1B_Male_Team1.docx		2		1				69	11
CAR4D_Male_Team9.docx		1	2					20	6
AZS4B_Fem_Team9.docx								18	5
ALX4A_Male_Team5.docx								25	5
ALV4C_Fem_Team5.docx				1				31	9
ALB1A_Male_Team3.docx								47	8
Totals	0	17	8	14	1	0			

The table indicates the frequency with which excerpts were coded as belonging to Phase IV. Out of 35 participants only 14 included comments in their conversations in which they

synthesized the material and tested it against their own schemata, experience, collected data or literature (Phase IV). The previous to the last column is a sum of all codes per participant (including all 5 phases) while the last column indicates the different codes in each of the participants' oral interventions (how a student produced statements in all or most of the coding schemes).

As it is evident from Table 14, participants did not produce any statements at the level of application of the newly constructed meaning (Phase V). If we deduct the codes in Phase IV from the total number of excerpts codified, we can find significantly larger numbers in the first three phases than in the last ones. It is also important to notice how different participants moved through the different phases of the model with more ease (high numbers in the last column) than others. In sum, the number of instances of social construction of knowledge decreases as the phases in the model increase. That is evident in the total number of instances of codes applied in each of the participants' transcribed conversations (Table 15).

Table 15

Total Number of Codes Applied in All Participants' Transcripts

	Phase1 (A-E)	Phase2 (A-C)	Phase3 (A-E)	Phase4 (A-E)	Phase5 (A-C)
Total	988	50	301	40	0

Other strategies for construction. The literature review that supports this research highlights the important role of frequency on vocabulary acquisition. A series of studies mentioned earlier point out that frequency functions as a predictor of vocabulary size (Stokes et al., 2012; Torki, 2011), a predictor of vocabulary learning (Joe, 2010), or as related to age of acquisition of object naming (Bonin et al., 2009). Learners may be unaware of the effect of repetition in vocabulary acquisition, but they effectively use this strategy in their interactions.

Code mixing is another strategy that learners used in connection to repetition. Finally, repetition and code mixing together with other strategies take place mainly because students engage in conversation. And conversation is intrinsically a social activity. In the next three subsections, there is a short description of each of these strategies (Repetition, Code mixing, and Social content) plus excerpts exemplifying them.

Repetition. Webb (2007) investigated the effects of repetition on vocabulary knowledge and concluded that greater gains in knowledge were found each time repetitions increased. The participants in this study used repetition as a strategy in their efforts to understand novel terms. By analyzing all instances in which one or several students in a discussion group repeated the new term, it was evident that it was a pervasive characteristic of all learners in this study. In fact, there are examples of the use of this strategy in all the groups, and all but six of the participants used it in one or more occasions during their interventions. In the conversations, words are repeated in different circumstances:

To clarify meaning and pronunciation of terms like with the term *sigh*:

<u>Excerpt Team 9 (Lines 3411, 3427)</u>

AZS4B: Ok. The first one says: What does his "sighing" mean ((mumbles the rest.))

MFZ4P: [sighing]

AZS4B: Oh, I, I know that sigh, sigh is like take a deep breath, and you ((sighs)) take-a-breath. What you do when you're in love? Hih, hih, hih.

MFZ4P: ((Mumbles.))

CAR4D: Ahhh now I understand it. Because he sees the delicious things on the TV, and he si, sigh, seeh, sih, how do you-

AZS4B: Sigh.

MFZ4P: Sigh.

CAR4D: sighs because he don't have that delicious meal on his house.

MFZ4P: [And, and he wants.]

AZS4B: [U:h huh. Uh huh.]

CAR4D: ((Sighs.)) I understand it.

((Laughs.))

MIO4S: Oh wow.

MFZ4P: Ok.

To reinforce meaning.

Excerpt Team 8 (Lines 2636, 2655)

SMM4W: [Hindsight?]

KCG4N: Hindsi:ght.

EST4G: Here.

SMM4W: It was-

KCG4N: (Ah hindsight xxx) like-

SMM4W: Hinnsight, hinnsight ((Mispronouncing word.))

KCG4N: Hinnsight?

EST4G: Hinnsight.

KCG4N: Hinnsight or hindsight?

SMM4W: Hinn-

EST4G: [It was like-]

EDW4F: Like when you think (xxx) about what you did.

KCG4N: [Li:ke-] (xxx) retros- retrospective. (xxx) we can say like that maybe.

EST4G: [Yes.]

SMM4W: It's like a (point of view, xxx).

EDW4F: Re- Retros-pective.

KCG4N: Retrospective.

EDW4F: Thinking about what you did.

KCG4N: [Yeah.]

EST4G: [Yes.]

In total there are 116 instances of words being repeated in different circumstances. N. Ellis (1994) points out that good language learners use repetition as a strategy when confronted with novel lexical items. This strategy aids them in long-term retention of vocabulary (p. 249).

Code mixing. Research by Sarwet (2010) posits the idea that repetition is related to a second strategy displayed by students in their conversations, code mixing. The author states that sometimes code mixing occurs to ensure communication because of the feeling that one language communicates the idea more accurately (p. 61). Concerning the role of repetitions in code mixing, the author states the following:

> Repetitions is one of the strategies used by bilingual speakers in the process of code mixing that they use to achieve certain linguistic goals: to re-emphasize their idea, ensure that they have conveyed to the listener exactly what they wanted to convey, to facilitate understanding on listener's part, and to convey certain socio-cultural connotations attached to the linguistic choice of the repeated item. [sic] (p. 60)

The students who participated in this research showed great resourcefulness in the use of code mixing and repetition in their social construction of meaning. The following excerpt clearly shows how they used this strategy:

<u>Excerpt Team 8 (Lines 3027, 3034)</u>

KCQ4M: No, but splurge, splurge.

LCH4O: Did you find it?

KCQ4M: I think it's a waste, wasting, like-

MAY4T: What is splurge?

KCQ4M: Derrochar, como derrochar, cómo era?

JSR4K: Oh yeah! It was derrochar! Derrochar.

LCH4O: [(xxx)] Ah yeah.

KCQ4M: Um waste.

Several other examples show how students continuously resort to this strategy to figure out terms such as bully, grill, sigh, and even complex terms like royalties and lollygagging. Even though students are unaware of research in the area of code mixing and vocabulary as an efficient and effective strategy (Celik, 2003), they normally use it for their benefit as part of their knowledge construction.

Social content. One last point that I want to mention is the use of social content as part of the students' interactions. Even though these exchanges are mainly off topic and offer little in terms of the lexical construction of meaning, they help students to feel like competent members of a group, promote cooperation, build rapport and from a social constructionist position like the one advocated in this research, social strategies facilitate interaction, promote the sense of community, and are essential for a social constructivist learning environment. In the present research, students for the most part kept their focus on the task and discussion. However, there were instances in which participants discussed about topics not related to the formal content of the task. Team 4 was particularly apt for social interactions. In fact, a great portion of their interaction was mostly socialization, like in this excerpt:

<u>Excerpt Team 4 (Lines 1115-1135)</u>

AND: [Do you play] sports?

MAJ1J: What?

AND: Sports?

RAN1Q: I like to swim, I like to swim [Swim?] But I, I [Yes, I-] I never practice.

AND: I would like to dance too.

RAN1Q: [I like- ((Giggles))]

NAF1N: I like to swim too.

RAN1Q: I would like to swim everyday. ((Giggles))

MAJ1J: [I like to swim.]

NAF1N: I practice every Saturday.

MAJ1J: Oh, that's so good!

RAN1Q: What do you practice?

NAF1N: One hour for week.

RAN1Q: Swim?

AND: [On Saturday?]

MAJ1J: Swim or swing?

NAF1N: Swim.

MAJ1J: Swim.

RAN1Q: Ah Swim.

NAF1N: Swim.

AND: De qué estamos hablando? ((What are we talking about?))

Part of this social content is exemplified in the use of humor which is recurrent in the different groups. More than 100 excerpts show signs of open humor or laughter among participants. This is just one example:

<u>Excerpt Team 2 (Lines 668-676)</u>

PRI1P: [Ahh, yah, yah. ((Giggles)) Ah ok.] And, and this, o three of the coolest words in the English language are being used less and less. So I'm writing my representative o

((Hissing sounds like reading silently in the background.))

MAC1I: The kid is worried about these three difficult words are about to disappear.

Pilar: [The coolest!]

MAC1I: Yeah.

NAT1M: The coolest.

PRI1P: THE COOLEST! For me no. Hah, haha.

Even though no studies show the effect of humor on vocabulary acquisition, it is undoubtedly a valuable resource to reduce tension, enlighten the task, and create rapport among participants.

Mixed approach analysis. One of the particularities of *Dedoose* is that it allows researchers to combine quantitative and qualitative information. The results of most of these analyses did not shed any new light on what has been reported previously. For example, age does not seem play a significant role in the different phases of construction, and the same is true of years of language studying. Other descriptors such as English language use or English language experience do not show particular trends in their connection with codes within the system.

However, some interesting trends are worth mentioning. Pre and posttests at their highest scores are somewhat correlated with higher frequencies in the application of codes in all the different phases of construction. Conversely, in the case of the use of strategies like code mixing and repetition, the frequency in the application of codes diminishes when related to high test scores.

A particular relationship occurs in the case of gender and the different code applications. When gender was analyzed in conjunction with all the codes in the system, males outperformed females in every single category, except Ph2/B, Clarification of disagreement (Table 16).

Table 16

Relationship between Gender and Codes

	Female	Male
Phase I: Share, compare info	456	640.32
[Ph1/A] Observation or Opinion	101	141.26
[Ph1/B] Agreement	118	138.95
[Ph1/C] Corroboration	57	75.26
[Ph1/D] Clarification	132	221.16
[Ph1/E] Problem	48	63.68
Phase II: Dissonance	25	30.11
[Ph2/A] Disagreement	13	18.53
[Ph2/B] Clarification of Disagreement	10	6.95
[Ph2/C] Restatement of Position	2	3.47
Phase III: Co-construction of Knowledge	124	215.37
[Ph3/A] Negotiation of Meaning	101	185.26
[Ph3/B] Negotiation Weight of Arguments	3	3.47
[Ph3/C] Identification of Agreement	2	3.47
[Ph3/D] Compromise / Co-Construction	11	13.89
[Ph3/E] Metaphors / Analogies	6	9.26
Phase IV: Testing and Modification	16	28.95
[Ph4/A] Testing Synthesis	7	11.58
[Ph4/B] Testing against Schema	3	6.95
[Ph4/C] Testing against Experience	6	9.26
[Ph4/D] Testing against Data	0	1.16
[Ph4/E] Testing against Literature	0	0
Phase V: Application	0	0
[Ph5/A] Summary	0	0
[Ph5/B] Application	0	0
[Ph5/C] Understanding of New Knowledge	0	0
Abrupt Shift	26	31.26
Aha	17	24.32
Humor	39	41.68
Reading	46	68.32
Repetition	53	72.95
Social Content	25	27.79
Spanish	45	59.05

These results are particularly interesting especially after considering that female students outnumber males in the sample, even though the figures are normalized.

Another interesting finding has to do with how female students with higher connected knowing scores tend to share and compare information (Phase I) more than their male counterparts at the same level in the connected knowing scale.

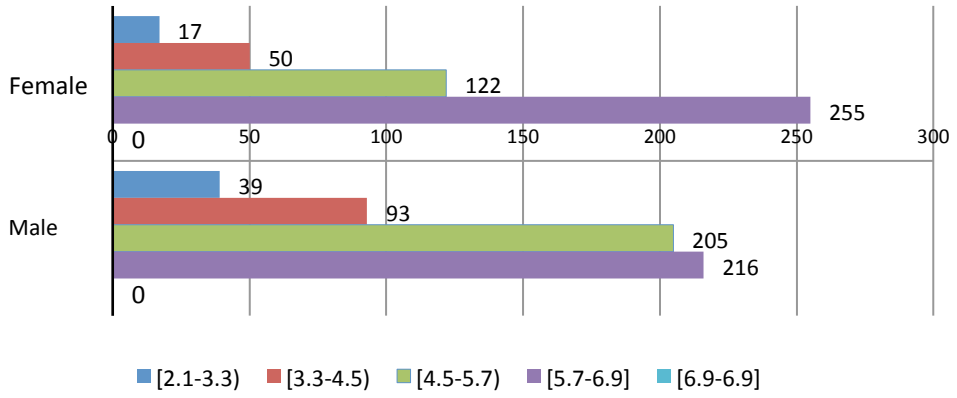


Figure 7. Frequency Gender x Connected Knowing x Phase I

The previous finding seems to be in agreement with the ways in which connected knowers best learn. However, the opposite does not seem to hold true. In the case of Separate Knowers, who thrive in confrontational discourse, the relationship with Phase II (Dissonance, Disagreements) at one point moves in the opposite direction.

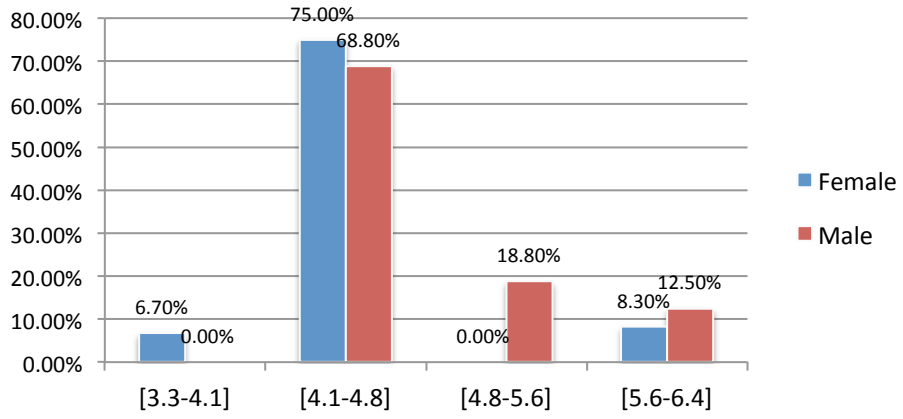


Figure 8. Percentage of the Relationship Among Variables (Gender, SK, Disagreements-Phase 2/A)

As Figure 8 shows female students with Separate Knowing scores in the 4.1 to 4.8 range are 6.2% units above males, in contraposition to what the literature says in this respect. Males

with high Separate Knowing scores (in the 4.8 to 6.4 range), however, outnumber female learners and show the expected tendency towards identifying and stating areas of disagreement, which is typical in male Separate Knowers.

Dysfunctions in construction. The contributions of individual members of the teams not always led to successful completion of the task or in the specific case of this research, to the appropriate construction of meaning. There are many instances in which students abruptly move to the next task without an appropriate transition or avoid coming to terms as to an agreed upon definition of the terms. This lack of resolution in their discussions was coded as Abrupt Shift and the number of abrupt changes or lack of resolution instances is considerable in the transcribed documents (149 applications of the code). The next excerpt is one of the many instances of lack of resolution or incorrect construction that appears in the conversations:

Excerpt Team 6 (Lines 2170-2188)

JUA4L: The only weird, the only strange word that I see is swanky.

PAB4V: And snooker.

JUA4L: Snooker?

PAB4V: Ye-

JUA4L: (Swanky) is that thing that you waste money.

JUA4L: [Ahh!] ((Unintelligible chat with PAB4V))

PAB4V: Yeah. Swanky is-

JUA4L: [waste money]

JUA4L: [Swanky is?]

PAB4V: When you spend a lot of money, waste-

JUA4L: But in an unuseful thing.

PAB4V: Unuseful things.

JUA4L: Eccentric, like eccentric.

PAB4V: Not necessary. but like

JUA4L: [Maybe.] Yes, wast, waste money.

PAB4V: Yeah, just waste money.

JUA4L: (xxx) just waste money.

PAB4V: In unuseful things. And snooker is [] a (.) kind of, of game. Kind of videogame.

JUA4L: [Snooker. A game. Play in a pool.] Yes, like pool but with uh red balls.

In the previous dialogue, it is obvious that students conform themselves with an approximation to the definition but their sense of urgency makes them accept it and move on. This tendency was more prevalent in some groups than in others.

Success in construction. In general, even with low proficiency groups, most of the interactions in the different groups led to the construction of knowledge at different levels. It can be stated that despite difficulties in terms of understanding, linguistic proficiency, and group interaction, the students could come up with successful definitions of the target words. One of the codes recollects all of the "Aha moments" that occurred during the dialogues. Under this codification, there is a summary of all those instances in which students moved from lack of understanding to comprehension. The data only show those moments of realization in which there is an audible expression of recognition, but it is evident that many of the interactions, negotiations, and "Eureka" moments go unsaid. Here is an example of one such Aha! moments:

<u>Transcript Team 2 (Lines 627-668)</u>

Pilar: [HOW ABOUT THIS ONE?]

PRI1P: What?

NAT1M: We're playing catch.

MAC1I: Ah. We're playing catch.

PRI1P: [o We're playing catch. o] Uhhh.

MAC1I: Traditional catch is is li:ke-

Pilar: [With a ball!]

MAC1I: Uh huh. Um, throw a ball-

Pilar: But they are playing with a phone or a with a (xxx cell) and (xxx) a game, with a game boy or something like that.

MAC1I: [with a phone, yeah.] It's like uh- Yeah, hih, hih, hih. They're making fun of the technology of nowadays.

PRI1P: [Uh?]

NAT1M: [Yeah.]

MAC1I: Because usually we play catch throwing the ball and you catch it with a glove, baseball glove.

PRI1P: [Uh huh. Hah, hah, hah.] Uh huh, uh, huh, uh, huh!

NAT1M: ((Indistinct.))

MAC1I: And they are playing (xxx) by a phone.

PRI1P: [Uh, huh.]

Pilar: [No, wh-] what is necessary to play traditional catch?

MAC1I: A baseball (.) ball and a glove.

PRI1P: Uh, huh.

Pilar: Yeah, but they are playing with-

NAT1M: With a phone! or something.

MAC1I: [telephone]

PRI1P: [So] they're making fun, they're making fun (xxx) or something.

MAC1I: Yeah, that's why the mom is like-

NAT1M: No, no, no, no, no!

PRI1P & Pilar: ((Laughs.))

NAT1M: They are playing with technology.

Pilar: Because everything is technology.

PRI1P: [Ahhh.]

NAT1M: Cause now it is-

PRI1P: [Ahhhhhh.]

MAC1I: [You see] they have like a Gameboy, a DS.

PRI1P: Ahh.

Pilar: And d d this question is for what is necessary to play traditional catch.

NAT1M: Because they are make exercise (xxx) something to share with his son and-

MAC1I: [You need a real ball and a real glove.]

PRI1P: [Ahh, yah, yah. ((Giggles)) Ah ok.]

The previous conversation shows how the interaction led by other team members leads one of them to realize not only the meaning of a word, but also the general context in which it appears.

Chapter Summary

This quasi-experiment used both a quantitative and qualitative approach to try to figure out the ways in which students' collaborative efforts lead to the construction of meaning and subsequently to the acquisition of novel lexical items. In particular, this study investigated the impact of the use of the Web as a springboard for lexical development and the effect of dialogues in the social construction of meaning.

The results supported the first hypothesis that given the same amount of time devoted to the two treatments, learners will experience greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores. The data produced after running a Simultaneous Multiple Linear Regression corroborated that there is a statistically significant difference in the marginal means

of the Web plus dialogue group, the Web-only group, and the Control group. In the case of the second hypothesis that tried to establish a positive link between Ways of Knowing and the Dialogical Construction of Knowledge, the results disconfirm any significant relationship between the two constructs. In fact, students who are connected knowers do not seem to obtain greater gains from dialogical interactions than separate knowers. The results obtained through a MR showed lack of significance in the case of connected knowing and a One-Way Anova comparison of the difference between means produced nonsignificant results. In addition, students' individual characteristics and experience with English (English background knowledge, time devoted to English tasks, and language use) did not show any statistical significance, disconfirming the third hypothesis that stated that such variables could affect test scores.

The qualitative portion of the results section produced interesting findings concerning students' preference for particular Web modalities and the process they go through in their social construction of meaning. In the case of students' preference for a particular Web modality to learn vocabulary, the results of the questionnaire showed that they favor definitions from Dictionary.com or literal translations from Google translate. General Google searches of the terms are less favored and Google images are viewed as impractical for their purposes.

In the case of the last research question referring to the ways in which learners construct knowledge, the results show how participants interact mostly to share and compare information and to negotiate or co-construct meaning. To a lesser degree, students explore areas of dissonance or inconsistency in their ideas. There were very few instances of synthesis of the newly constructed knowledge in learners' interactions and there were no signs of application of the newly constructed knowledge in terms of summarization of agreements or metacognitive illustrations of understanding. The results also pointed out some tendencies in strategy use

among students. In fact, participants seemed to favor repetition of lexical items and code mixing in their conversations. Elements of social rapport were also evident in the use of off-task dialogue and humorous comments or laughs.

Chapter 5
Discussion

The results indicate that there are statistically significant differences in the marginal means of the two treatment groups (Web plus dialogical interactions and Web-only group). In the particular case of first-year language learners studying English at the University of Costa Rica, as a group, they show statistically significant gains in the acquisition and retention of novel lexical items when exposed to the definitions of the target words through multiple Web modalities and given the chance to talk about the words in subsequent oral interactions. In fact, the group exposed to multiple sources of definitional input from the Web and allowed to discuss their findings dialogically fared better in the posttest than the Web-only group whose marginal means were 6.26 units below or the Control group (B = -24.40). Overall, this study provides additional support for the benefits of the Web as a source of definitional input and for the advantages of oral interaction in FL vocabulary acquisition especially if the input is presented through different modalities.

If besides the Web, teachers provide space for the explicit discussion of the meanings of target words in groups, the likelihood of improving the acquisition and retention of vocabulary is increased. This finding reinforces the principal premise in this work that emphasizes the primal role of interaction in the construction of knowledge. However, the Web is simply a valuable resource in the semantic construction process, not the panacea for lexical acquisition. In fact, the way in which students assessed the Web resources used in the present study provided clues about the utility of these tools in the teaching of novel vocabulary. In the case of the lexical units evaluated in this research, students favored direct definitions of the terms in the native language provided by Dictionary.com or literal translations from Google translate. The Google images

resource was not viewed as a valuable definitional tool while a simple Google search of the term had mixed reviews.

Concerning the qualitative analysis of students' dialogical interactions, it was evident that learners do construct knowledge in their collaborative dialogues. One important aspect to point out is the students' progression through the different phases of the construction model that exemplifies an active co-construction of knowledge. This progression provided evidence of how learners actively participated in the basic understanding of the task at hand (figuring out the meaning of the comic strips). It also demonstrated how learners developed a semantic framework for the comprehension of the target vocabulary through the collaboration of the different participants in the discussions. Besides, the construction of meaning carried out by the participants in the dialogical interactions was further supported by the students' use of certain strategies that served them well in their efforts to understand and reinforce the newly constructed knowledge. These strategies included repetition, code mixing, and the inclusion of social content all of which reinforced meaning, clarified pronunciation, and helped students establish rapport and promote collaboration, which are essential elements in a constructionist task.

Respecting the research hypotheses and questions included in this work, there were interesting and at times contradictory findings in the analysis of the data. Hypothesis 1 stated that given the same amount of time devoted to the two treatments, learners would experience greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores. The results of the Simultaneous Multiple Linear Regression showed that the Web plus dialogue group outscored the Web-only group by a difference of 6 units in their marginal means. This finding gives credence to the inclusion of both the Web as a source of definitional input and group

dialogues for the co-creation of meanings. The additional information provided by the dialogical interactions plus the pushed output prompted by the conversations could certainly account for the differences between groups. It is also important to emphasize that there were statistically significant differences between the Web alone and the Web plus dialogues groups and the Control group. This by itself is a sign of the importance of the Web in the provision of input for the students' semantic elaboration of novel lexical items.

Hypothesis 2 sustained the point that connected knowers would obtain greater gains from dialogical interactions than separate knowers. As it was evident that the dialogical interactions had predictive value in the Multiple Regression model, the inclusion of a variable that took into account ways of knowing was included. It was hypothesized that students who preferred working in groups would benefit from dialogues while independent knowers would obtain fewer gains from collaborative activities. After applying the ATTLS, it was evident that some students were certainly connected knowers while others were separate knowers. The data gathered through the ATTLS also confirmed that there were certain gender differences concerning students' ways of knowing. When the variable Male was regressed on Separate Learning Scores, the model was statistically significant while the regression of Male on Connected Learning Scores was nonsignificant. With these results, it was evident that there was a connection between gender and ways of knowing; however, it was not clear whether that connection persisted when analyzed in relation to vocabulary acquisition. Previous research on Ways of Knowing had determined that females consistently showed high CK and low SK preferences (Belenky, 1997; Galotti et al., 1999). By including both Connected Knowing and Separate Knowing in a regression model as dependent variables and regressing them on gender, only the Separate Knowing construct was significant in the case of males. The connection between

Connected Knowing and gender was nonsignificant. I did not find, however, any explanatory power in the relation between these variables and posttest results. In fact, learning preference (Ways of Knowing) did not seem to have any effect on vocabulary acquisition as assessed in a posttest measure. Further ANOVA and Post Hoc analyses suggested that there were no significant differences between Connected Knowing, Separate Knowing and gender in relation to posttest results.

One possible explanation for the lack of significance between ways of knowing and vocabulary acquisition and retention can be found in Galotti et al.'s own conclusions. For instance, their research has shown that neither learning preference has been correlated with cognitive measures of performance. In fact, the CK and SK constructs function more as approaches or styles than as basic abilities (Galotti et al., 1999). As acquisition, retention and recall are related to cognitive abilities, a relation between the ATTLS and the results of the posttest in vocabulary is unlikely to occur. Vocabulary acquisition and retention involves cognitive processing in terms of memory and recall of semantic components of words; consequently, an instrument such as the ATTLS is expected to yield nonsignificant results when contrasted with an "incompatible" construct. Besides, Ryan and David (2003) showed that the Ways of Knowing construct was context-dependent. In other words, social context more than gender determines knowing style. The current research was conducted in a way in which gender became a non-salient feature partly due to the social context established (groups included both male and female students). This could be a reason why the results of the ATTLS showed no significance in the connection between gender and ways of knowing and posttest results.

Hypothesis 3 tried to study the relationship between vocabulary acquisition and certain language variables. It was hypothesized that students' individual characteristics and experience

with English (English background knowledge, time devoted to English tasks, and language use) affected test scores. The results showed no significant relationship among variables, which could be due to the fact that the variables chosen were more connected to general language acquisition than to vocabulary acquisition per se. Variables that have been found to influence the learning of word meanings from context include familiarity of the term, reading ability, or identification of contextual clues. The language background and language use variables emphasize general linguistic ability and prioritize prior knowledge that may help in overall language comprehension but might have little bearing on vocabulary acquisition. It would be advisable to initially have a general measure of vocabulary knowledge as a predictor of vocabulary gain in future studies. Also, students who obtained high scores on language knowledge and use could be affected by a ceiling effect in which the more able students get fewer opportunities for gains in word knowledge. In sum, as Ellis (1995) points out: "What seems to be critical is not sheer amount of experience but rather what one has been able to learn from and do with that experience" (p. 10).

The qualitative section of this work included two separate questions. The first one was related to students' preferences concerning the role of Web multimodality. The purpose of this question was to find out the learners' preference for a particular input modality from the Web to learn vocabulary. This question was answered with an analysis of students' answers to a Likert-style question. Students showed a preference for definitions in the target language from Dictionary.com and a literal translation of the target word from Google translate. Those results confirm research by Bell and LeBlanc (2000) that emphasize that authentic material from the Web is more effective than adapted material for use in English as second language contexts. They also point out the beneficial inclusion of glosses in the students' native language. Yongqi

Gu's research findings (2003) also emphasize the importance of the use of a bilingual dictionary that includes the students' native language. As Ellis (1995) points out, "there are clearly many benefits for vocabulary acquisition from CALL provision of on-line dictionaries, contextual examples of usage, and synonym, antonym and other associative thesaural information" (p. 13).

The second qualitative question was aimed at discovering the ways in which learners constructed meaning through their dialogical interactions. As it was mentioned before, students who had the chance to interact fared better in a posttest on vocabulary acquisition than those who only had access to the online definitions. In order to discover how students constructed meaning, their oral interactions were recorded and coded applying Gunawardena, Lowe, and Anderson's Interactional Analysis Model and Gunawardena, Lowe, and Anderson's Tool for Testing Constructivist and Social-Constructivist Learning Theories (1997, 1998). Students' coded discussions showed examples of each of the four first phases of knowledge construction, which is a clear sign of co-construction. Even though a great number of the interactions were coded as belonging to the first three phases, the quality of the construction of knowledge is evident especially if we consider the level of the students (first-year English as a foreign language majors). In the present study, there were no instances of coding at Phase 5. The prevalence of coding in the first four phases of the construction model show evidence of how students share and compare information with each other (Phase 1), discover and explore dissonance or inconsistency among ideas, concepts or statements (Phase 2), negotiate meaning and co-construct knowledge (Phase 3), and finally synthesize their constructions and test them against their own culture, existing cognitive schema or personal experience (Phase 4). The way in which the dialogues were structured (prompted by comic strips containing the target words) may have limited the process of co-construction and influenced the transition to the "higher" levels of

meaning creation (Phase 5: Application of newly-constructed meaning). The dialogues were loosely guided by questions that could have required more scaffolding and clearer guidelines in order to promote "higher order" interactions. However, as the main purpose was to discover the ways in which students naturally produced meaning, more structured guidelines were left out of the treatment. In general, the co-construction of knowledge that took place in the students' dialogical interactions led many students to "discover" and reinforce the meaning of many of the target lexical units and to obtain greater input that in the end may have been the major factor in the retention and acquisition of semantic content.

Furthermore, the results also suggest that learners can and indeed construct meaning through collaboration (Swain & Lapkin, 1998, 2000, 2001). The knowledge that learners collectively construct gives students the chance to benefit from the extra repetition of the terms during the oral interactions. The benefits of repetition are enhanced by the use of code mixing as a way to comprehend semantic elements, to get acquainted with other aspects of word knowledge such as pronunciation, morphological and syntactical features, and to include the words into meaningful contexts.

As mentioned in the previous section and in Chapter 2, there is considerable research indicating the benefits of interaction in first and second language learning. This work adds to the literature by including a foreign language perspective and by integrating other aspects that are also beneficial for vocabulary acquisition such as the use of the Web and its multimodality capabilities in learning lexical meaning, and by providing a mixed-research analysis of students' interactions from a social constructionist perspective.

Pedagogical Implications

The findings in the current research have clear pedagogical implications. One of the most ubiquitous is the importance of viewing meaning as use in which users and interactions should be at the forefront. The results of this study also reinforce the importance of group or pair work in the foreign language classroom. Language is intrinsically linked to communication and in order to communicate, individuals should interact. To rely on teacher-centered perspectives in the classroom is to deny students the opportunity to actively participate in the knowledge-creation process and to prevent them from becoming accountable for their own learning. Under this model, student-to-student interactions should be at the core of the educational experience, and educators should develop instructional tasks that take advantage of the learners' impulse to interact. Also, the implementation of tasks that promote the negotiation of meaning in the classroom seems to be a viable pedagogical intervention.

Also the findings in this work support the use of multimodality to increase the amount of input that students are exposed to. The use of multiple modes to present vocabulary makes input more comprehensible and students find them useful in their learning efforts. The Web is flexible enough to include multimodal presentations that could eventually facilitate both teaching and learning in the classroom.

Limitations

Despite the efforts to be as thorough as possible in the design and presentation of findings, this research project is limited in some respects. One of the most salient limitations is the one referring to the spacing effect (N. C. Ellis, 1995). This study only considers the rate of initial acquisition and retention over a short period of time, in fact, the presentation of the target lexical items took place in one single session; therefore, the words were not "spaced" appropriately over

several sessions. This limitation has consequences in terms of how students acquire lexical items and in the recall of terms. Another limitation related to timing has to do with the spacing between pre and posttests. A two-week period between applications of the treatments is the norm in many of these quasi-experiments, but this time period does not really account for "long-term" retention.

One more limitation is assessment. There are so many issues connected to vocabulary learning that it is almost impossible to have a single instrument to account for all of them (Pronunciation, orthography, use, semantic features, etc.). The use of the Vocabulary Knowledge Scale, though effective in the assessment of gains in the short term, leaves out many other elements of vocabulary learning that could be significant for research on lexical acquisition. It is generally suggested to use more than one instrument for assessment, and as the area of vocabulary is so vast, such suggestion is reasonable.

There are also intrinsic limitations in the research approach used. In the case of the current work, transferability, rather than generalizability, is the issue in qualitative-interpretive research (Guba & Lincoln, 1989). Also, from a quantitative perspective and supporting the spacing issue mentioned before, the pre-posttest design has certain limitations itself. O'Rourke and Carson (2010) mention that the "great disadvantage of this experimental design is […] that post-tests can only relate to short-term effects—even if there is an attempt to prolong the intervals (p. 32)."

Considering the aforementioned limitations and the general ones mentioned in Chapter 3, it is advisable to be prudent on the implications of this work and the applicability of the results. The research showed that the interactional approach has an effect on this particular group of students, in their particular circumstances, and under a specific cultural and social milieu. More

research is required to confirm many of the aspects related to interaction and vocabulary acquisition as the following section develops.

Suggestions for Further Study

Undoubtedly, there is the need for more research to understand more fully how interaction works, how to better integrate collaborative activities into the classroom, and how to better tap on students' capability to co-construct knowledge and expand its potential. There is also a need for further research to identify the most effective way to highlight vocabulary definitions in the Web to increase comprehension. As students mentioned that Dictionary.com and Google translate were the most useful resources, it would be interesting to identify the elements that these pages contain that make them attractive to students.

Further research on the features that promote "real" long-term retention of meaning is necessary. Research should also be focused on the functions of multimodality and their effect on learning. It is also advisable to further analyze how learners' aptitudes and attitudes affect vocabulary acquisition and to investigate some other variables that could affect vocabulary acquisition more directly. It would be interesting to investigate how the variables included in the current research would work with a larger sample and with the possibility of random assignment. The qualitative analysis also brought out certain elements that would be interesting to analyze. For example, more research on the use of humor and social content in the construction of meaning would be an interesting alternative. Extra research on how repetition, code mixing, and the use of metaphors in lexical development could also offer lines of investigation.

Concerning the model of knowledge construction, why is it that students do not seem to interact at the levels of synthesis and application of new knowledge? Is it an expectation that researchers had when they created the model and that is rarely fulfilled in actual academic

contexts? Is it an expected result of interaction? Is it typical in other forms of interaction? Does the task have any influence? Could students move to the "higher" phases under other conditions? Swain et al. (2002) emphasized the relevance of collaborative dialogue and they suggested teaching learners how and why to collaborate. More research on effective and efficient techniques for collaboration is necessary. All these issues require clarification that could be achieved with further investigations.

Finally, one aspect that was left out from analysis in the present research was the particular effect that comic strips can have in students' motivation and comprehension. A study of the aesthetic, cultural and affective components of comic strips could be a viable option for further research. It would also be important to find out what combination of online resources could be the most effective for students' acquisition of semantic content.

Chapter Summary

This final chapter summarized the results obtained from the analysis of the data and how the findings in the current research could be used for pedagogical purposes. Several limitations in terms of research methodology were pinpointed and recommendations for further studies were advanced.

Conclusion

Based on the results from this study, it is clear that giving students the chance to interact and to share their findings about the semantic components of different terms really help them to acquire and retain the meaning of novel words. Even though there are differences in the effectiveness of their interactions, students make use of several strategies that facilitate their transitions through the different phases of knowledge construction. Despite some drawbacks, learners effectively interact and reach satisfactory conclusions with respect to the semantic

content of newly acquired words. As it was evident from their interactions, learners successfully moved along 4 of the 5 phases proposed by Gunawardena, Lowe, and Anderson. The coding of the transcribed oral interactions showed that learners shared and compared information, stated their opinions, corroborated examples, asked and answered questions to clarify details, and defined, described, or identified problems (Phase 1). They were also able to identify areas of disagreements and ask and answer questions to clarify the extent of disagreements (Phase 2). Besides, learners showed the ability to negotiate and clarify the meaning of terms (Phase 3) and to synthesize their co-constructions or even modify them by testing them against facts, schemata, data, or personal experience (Phase 4) (Gunawardena et al., 1997, 1998).

The present study also confirmed the usefulness of the Web and its resources as a valuable tool in the provision of definitional input for students of English as a foreign language. The potential effect of multimodality needs to be assessed effectively especially after considering the way students positively appraised online tools such as Dictionary.com, Google translate and Google search. It is not clear whether the different tools together have an overall effect on learners' vocabulary acquisition and retention, but what can be concluded from the results is that the Web has a positive effect on the learning of novel lexical items, as it was evident in the significant differences between both treatment groups and the Control group.

As a final remark, the decision to investigate the intricacies of meaning creation was appropriate. It was fascinating to delve into the depths of vocabulary acquisition, the power of words to create knowledge, and their appropriation by users. Taking a social constructionist perspective provided me with a vantage point to deal with words in their most intrinsic nature, i.e. use. Meaning as use led me to the individuals who use words to create meaning. In order to understand how users manipulate their tools (words), it was necessary to deal with interaction in

natural settings. To keep coherence in the approach, the use of an encompassing research perspective became imperative. A mixed-methods approach with its pragmatic threads was the most obvious choice. It allowed me to integrate the pragmatic elements of social constructionism with the pragmatic components of mixed-methods research in a study of the pragmatic use of lexical items. As mentioned in the first chapter, the coherence among the different components of this study established the theoretical foundation for the search of meaning in learners' interactions, and this search is definitely an ongoing human endeavor whose value lies in the process, not in the end.

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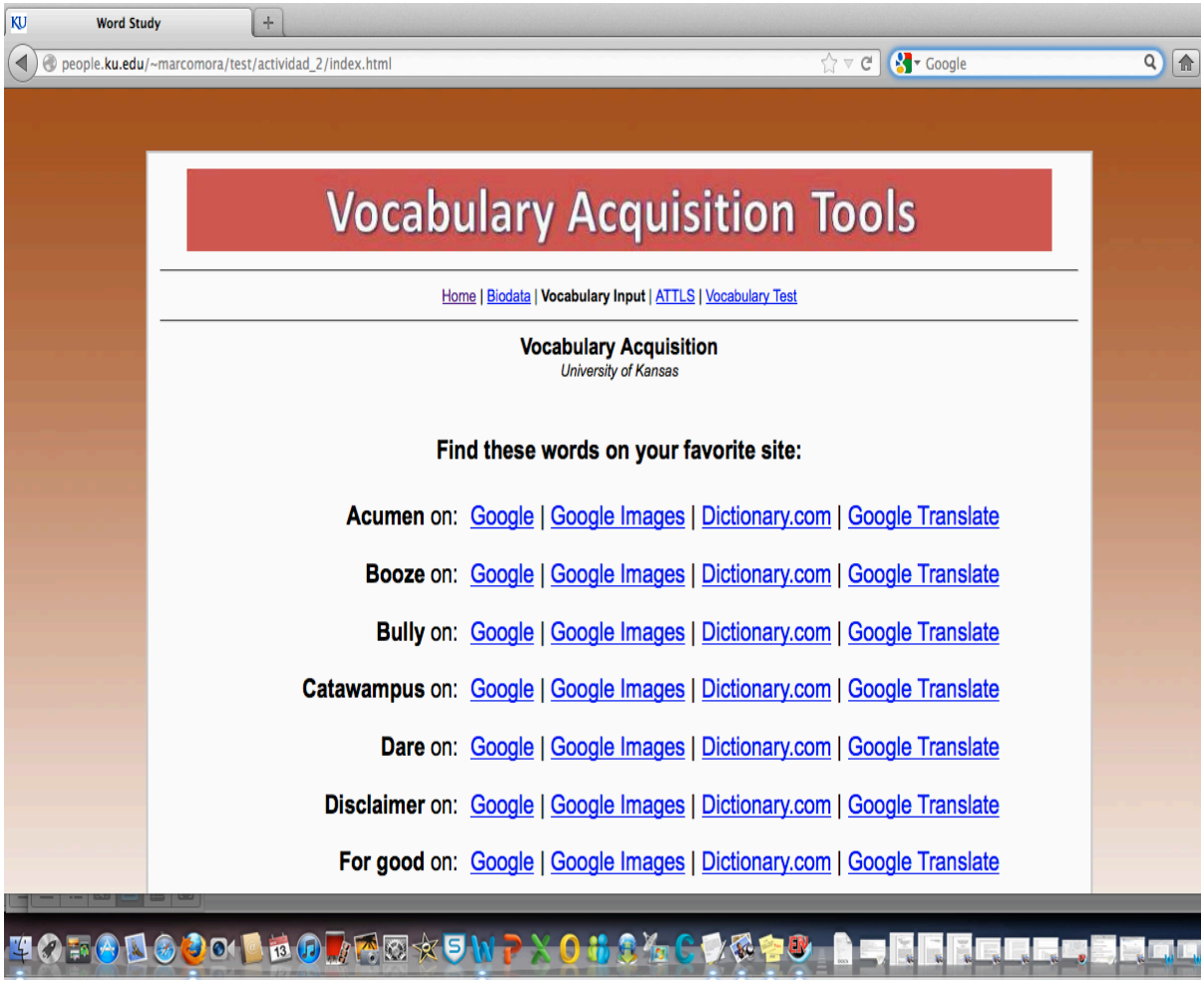
Appendices

Appendix A

Multimodal presentation of lexical items in a Webpage



Appendix B
Vocabulary Knowledge Scale

The following activity will ask you to assess how familiar you are with a number of different words. Please rate each work on how well you know it. Answer as accurately as you can. For items III and IV you can use either an English synonym (a word in English with the same meaning) or a Spanish translation. The scale is as follows:

1. I don't remember having seen this word before.
2. I have seen this word before but I don't know what it means.
3. I have seen this word before and I think it means…(synonym or translation)
4. I know this word: it means….(synonym or translation)
5. I can use this word in a sentence, e.g….(If you do this section, please do # 4 too.)

Table B1
Interpretation of the VKS scores

Self-report categories	Possible scores	Meaning of scores
I.	1	The word is not familiar at all.
II.	2	The word is familiar but the meaning is not known.
III.	3	A correct synonym or translation is given.
IV.	4	The word is used with semantic appropriateness in a sentence.
V.	5	The word is used with semantic appropriateness and grammatical accuracy in a sentence

Appendix C
Pre-Posttest (Final version)

Name:_____ Research Code: _____

LM-1001, Group:_____

Look at the following list of words and give each one a number rating 1-5 on how well you know the word.

Look at the Vocabulary Knowledge Scale (VKS) below:

6. I don't remember having seen this word before.
7. I have seen this word before but I don't know what it means.
8. I have seen this word before and I think it means…(synonym or translation)
9. I know this word: it means….(synonym or translation)
10. I can use this word in a sentence, e.g….(If you do this section, please do # 4 too.)

(Source: Wesche & Paribakht (1996). Assessing second language vocabulary knowledge: Depth vs. breadth. *Canadian Modern Language Review*, 53, pp. 13-40.)

English word	1-5	Traducción o sinónimo	English sentence
Acumen			
Booze			
Bully			
Catawampus			
Dare			
Degree			
Disclaimers			
Fiber			
For good			
Groceries			
Hindsight			
Lazy bums			
Leather-bound			
Liable			
Lollygagging			
Lurch			
Nourishing			
Outpatient			
Placement			
Playing catch			
Pranks			
Royalties			
Shenanigans			
Sighing			
Snooker			
Spasm			
Splurged			
Swanky			
Swing			
Thirtysomethings			

Appendix D

Biographical survey

Name: _____ Research Code:_____

Gender: ____Male ____Female Age: ____ First Language: _____

E-mail address _____

Years studying English: _____

Age when you started studying English: _____

Where have you studied English? (mark as many as needed)	Duration (years)	Native English Teacher? Yes	No
____ Pre-school	_____	____	____
____ Kindergarten	_____	____	____
____ Elementary School	_____	____	____
____ High-school	_____	____	____
____ Language school	_____	____	____
____ Private teacher	_____	____	____

How many English classes are you taking now? (Name them)

_____

How many hours per week do you spend using English outside class to…

Do homework	0	1-2	3-4	5-6
Prepare for quizzes of exams	0	1-2	3-4	5-6
Listen to language audio	0	1-2	3-4	5-6
Read for fun	0	1-2	3-4	5-6
Listen to music	0	1-2	3-4	5-6
Watch TV, video, movies	0	1-2	3-4	5-6
Talk to English-speaking friends	0	1-2	3-4	5-6
Talk to tourists	0	1-2	3-4	5-6
Talk to English-speaking family	0	1-2	3-4	5-6

Have you ever lived in an English-speaking country? How long?_____

Have you ever been to a country where you spoke English to communicate? How long?_____

Do you know any other languages? Which one(s)?_____

Appendix E

Links to comic strips used as prompts for dialogical interactions

Comic Strip: *Adam @ home*

Link: http://wpcomics.washingtonpost.com/client/wpc/ad/

Target words: acumen, royalties
Question: What does he mean by "royalties flooding in" and his "musical acumen"?

Comic Strip: *Andy Capp*

http://comics.washingtonpost.com/11_comics_andy-capp.html

Target words: snooker, swanky
Questions: Why is the Grand a swanky hotel?

How does it compare to the Snooker club?

Comic Strip: *B.C.*

http://www.creators.com/comics/bc/90684.html

Target word: bully
Question: Why would a bully from school have lunch request?

Comic Strip: Baby Blues

http://www.washingtonpost.com/wpsrv/artsandliving/comics/king_baby_blues.html?name=Baby_Blues

Target word: pranks
Question: The kid amplified his burp to scare his sister. Do pranks require so much elaboration or can they be simpler?

Comic Strip: *Baldo*

http://wpcomics.washingtonpost.com/client/wpc/ba/

Target word: booze
Question: We don't know what Tia Carmen has in her flask. What does the nephew believe she's drinking and why does he seem astonished?

Comic Strip: *Barney & Clyde*

http://www.washingtonpost.com/wpsrv/artsandliving/comics/barney_clyde.html?name=Barney_Clyde

Target word: thirthysomethings
Question: The kid is talking about different generations. When were the "thirthysomethings" born?

Comic Strip: *Dilbert*

http://www.uclick.com/client/wpc/dt/

Target word: hindsight
Question: Why would hindsight be a good approach to the problem?

Comic Strip: *Hi and Lois*

http://www.washingtonpost.com/wpsrv/artsandliving/comics/king_hi_lois.html?name=Hi_and_Lois

Target Word: splurged
Question: What would be another term for splurge?

Comic Strip: *The Lockhorns*

http://www.washingtonpost.com/wpsrv/artsandliving/comics/king.html?name=Lockhorns&date=20120423

Target Word: sighing
Question: What does his "sighing" mean in the context of the comic strip?

Comic Strip: *Momma*
http://www.creators.com/comics/24/90722.html

Target Word: Lazy bum, leather-bound
Questions: A leather-bound directory of companies would be something like… What other items are leather-bound?

Why does the lady call her son a lazy bum?

Comic Strip: *Non Sequitur*

http://wpcomics.washingtonpost.com/client/wpc/nq/2012/05/04/

Target Words: liable, disclaimers
Questions: Duh is an oral expression that means: "Well, it's obvious." Why does she say that not handing the book report is obvious?

What is a possible connection between a disclaimer and being liable?

Comic Strip: *Real Life Adventures*

http://wpcomics.washingtonpost.com/client/wpc/rl/2012/05/03/

Target Words: swing, lurch, spasm
Questions: What are they talking about? What does he use that description for?

Comic Strip: *Red and Rover*

http://wpcomics.washingtonpost.com/client/wpc/wpred/2012/05/05/

Target Words: dare, catawampus, lollygagging, shenanigans
Questions: What is the kid worried about? What would happen if the words disappear 'for good'?

What does 'dare' mean?

What is the point of the joke?

Comic Strip: *Speed Bump*

http://www.creators.com/comics/2/90709.html

Target words: playing catch
Question: What is necessary to play "traditional" catch?

Comic Strip: *Zits*

http://www.washingtonpost.com/wpsrv/artsandliving/comics/king.html?name=Zits&date=20120501

Target Words: outpatient procedure
Question: What would be a typical outpatient procedure?

Appendix F
Web preference survey

Vocabulary Tools in the Web

Exit this survey

1. From the links provided. Which do you find more useful to understand the meaning of words?

	Very useful	Useful	Of little use	Not useful
Google	○	○	○	○
Google images	○	○	○	○
Dictionary.com	○	○	○	○
Google translate	○	○	○	○

Done

Appendix G
Informed consent statement

INFORMED CONSENT STATEMENT

Using the Web as Input and Discourse Interactions for the Construction of Meaning and the Acquisition of Lexical Units in University Level English as a Foreign Language

INTRODUCTION

The Department of Curriculum and Teaching at The University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time. If you do withdraw from this study, it will not affect your relationship with this unit, the services it may provide to you, or The University of Kansas.

PURPOSE OF THE STUDY

You are being asked to participate in a study on the acquisition of vocabulary by foreign language learners of English. We are particularly interested in looking at how learners process input in a foreign language context and investigating how they construct meaning through dialogical interactions.

PROCEDURES

During the experiment, you will be asked to access information about several words on a personal computer with Internet access. ***Even though, the Web host used for this research includes security tools, it is possible, as with all Internet communications, that through intent or accident someone other than the intended recipient may see your response.*** During this part of the research, you will read information about the lexical items in terms of written definitions, images, and translations. This information will later be used as input for group discussions. During these oral interactions, you will be discussing certain texts that contain the target words. The purpose is to record the ways in which learners construct meanings through social interactions. *These interactions will be audio-recorded and later coded by the experimenter.* ***These recordings are a required element in the implementation of the research. However, you may opt out of the recording session or may stop the recording at any time you deem necessary. The recordings will be kept electronically in password-protected files and they will be deleted once the experimenter transcribes them. Only the researcher would have access to the recordings.*** The whole experiment will take about 1 hour and 40 minutes.

RISKS

This experiment involves no discomfort or risk. Your performance on the task will be held in confidence and at no time will the results refer to you specifically by name.

BENEFITS

Although the experiment is not expected to be of immediate benefit to you, you might find the task interesting as a foreign language learner. You may also find that the tasks provide a good opportunity for language practice. Your participation will be beneficial in terms of the added value to scholarship in general and the increase in language practice provided by the treatment itself.

PAYMENT TO PARTICIPANTS

No stipulated compensation is included for your participation in this research. Therefore, your involvement is completely voluntary and gratuitous.

INFORMATION TO BE DISCLOSED

To perform this study, we will collect information about you. This information will be obtained from a brief questionnaire about your language background. Your name will not be associated in any way with the information collected about you or with the research findings from this study. We will use a study number, initials, or a pseudonym instead of your name.

The prospective candidate Marco A. Mora Piedra exclusively for research purposes will use the information collected about you. Again, your name would not be associated with the information that you disclose. The researcher will not share information about you with anyone not specified above unless required by law or unless you give written permission.

Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of your information for purposes of this study at any time in the future.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, you cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent to participate in this study at any time. You also have the right to cancel your permission to use and disclose information collected about you, in writing, at any time, by sending your written request to: *Dr. Paul Markham, Dept. of Curriculum and Teaching, University of Kansas, Joseph R. Pearson Hall Rm. 440, 1122 W. Campus Rd., Lawrence, KS 66045-3101, U.S.A*. If you cancel permission to use your information, the researchers will stop collecting additional information about you. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

PARTICIPANT CERTIFICATION

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received

answers to, any questions I had regarding the study and the use and disclosure of information about me for the study. I understand that if I have any additional questions about my rights as a research participant, I may call +1 785-864-7429 or write to the Human Subjects Committee Lawrence Campus (HSCL), The University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, U.S.A., or email irb@ku.edu.

I agree to take part in this study as a research participant. I further agree to the uses and disclosures of my information as described above. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

_____ _____

Type/Print Participant's Name Date

_____

Participant's Signature

Researchers' contact information:

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Appendix H
Attitude toward Thinking and Learning Survey (ATTLS)

Attitudes Toward Thinking and Learning Survey

Questionnaire order of items:

Item #	*Scale*	*Item wording* (**bold** indicates negative wording, item score must be reverse-coded)
1	CK	When I encounter people whose opinions seem alien to me, I make a deliberate effort to "extend" myself into that person, to try to see how they could have those opinions.
2	SK	I like playing devil's advocate—arguing the opposite of what someone is saying.
3	SK	It's important for me to remove myself from analysis of something and remain objectives possible.
4	CK	I can obtain insight into opinions that differ from mine through empathy.
5	CK	I tend to put myself in other people's shoes when discussing controversial issues, to see why they think the way they do.
6	SK	I try to listen to other people's position with a critical eye.
7	SK	I find that I can strengthen my own position through arguing with someone who disagrees with me.
8	CK	I'm more likely to try to understand someone else's opinion than to try to evaluate it.
9	SK	One could call my way of analyzing things "putting them on trial", because of how careful I am to consider all of the evidence.
10	CK	I try to think with people instead of against them.
11	SK	I often find myself arguing with the authors of books I read, trying to logically figure out why they're wrong.
12	SK	I have certain criteria I use in evaluating arguments.
13	SK	I try to "shoot holes" in what other people are saying to help them clarify their arguments.
14	CK	I feel that the best way for me to achieve my own identity is to interact with a variety of other people.
15	CK	I am always interested in knowing why people say and believe the things they do.
16	SK	I spend time figuring out what's "wrong" with things; for example, I'll look for something in a literary interpretation that isn't argued well enough.
17	CK	I enjoy hearing the opinions of people who come from backgrounds different from mine—it helps me understand how the same things can be seen in such different ways.
18	SK	I value the use of logic and reason over the incorporation of my own concerns when solving problems.
19	CK	The most important part of my education has been learning to understand people who are very different from me.
20	CK	I like to understand where other people are "coming from", what experiences have led them to feel the way they do.

Table H1
Summary and scoring

Scale	*Number of Items*	*Negatively-Worded Items*
Separate Knowing	10	None
Connected Knowing	10	None

Scoring:

This survey has 2 scales. Sum items in each scale for separate scores on both types of knowing.

Galotti et al. (1999). A new way of assessing ways of knowing: The Attitudes toward Thinking and Learning Survey. Sex Roles; 40 (9/10), pp. 745-766

Used with permission from author.

Table H2
ATTLS, Items by scale

Attitudes Toward Thinking and Learning Survey

Items by scale

Note: No items in this scale are negatively worded.

Separate Knowing

1. I like playing devil's advocate—arguing the opposite of what someone is saying.
2. It's important for me to remove myself from analysis of something and remain objectives possible.
3. I try to listen to other people's position with a critical eye.
4. I find that I can strengthen my own position through arguing with someone who disagrees with me.
5. One could call my way of analyzing things "putting them on trial", because of how careful I am to consider all of the evidence.
6. I often find myself arguing with the authors of books I read, trying to logically figure out why they're wrong.
7. I have certain criteria I use in evaluating arguments.
8. I try to "shoot holes" in what other people are saying to help them clarify their arguments.
9. I spend time figuring out what's "wrong" with things; for example, I'll look for something in a literary interpretation that isn't argued well enough.
10. I value the use of logic and reason over the incorporation of my own concerns when solving problems.

Connected Knowing

1. When I encounter people whose opinions seem alien to me, I make a deliberate effort to "extend" myself into that person, to try to see how they could have those opinions.
2. I can obtain insight into opinions that differ from mine through empathy.
3. I tend to put myself in other people's shoes when discussing controversial issues, to see why they think the way they do.
4. I'm more likely to try to understand someone else's opinion than to try to evaluate it.
5. I try to think with people instead of against them.
6. I feel that the best way for me to achieve my own identity is to interact with a variety of other people.
7. I am always interested in knowing why people say and believe the things they do.
8. I enjoy hearing the opinions of people who come from backgrounds different from mine—it helps me understand how the same things can be seen in such different ways.
9. The most important part of my education has been learning to understand people who are very different from me.
10. I like to understand where other people are "coming from", what experiences have led them to feel the way they do.

Name: _____ Research Code:_____

Attitudes Toward Thinking and Learning Survey (ATTLS)	Strongly Disagree 1	Somewhat disagree 2	Slightly disagree 3	Neither Agree nor Disagree 4	Slightly agree 5	Somewhat agree 6	Strongly Agree 7
When I encounter people whose opinions seem alien to me, I make a deliberate effort to "extend" myself into that person, to try to see how they could have those opinions.	○	○	○	○	○	○	○
I like playing devil's advocate—arguing the opposite of what someone is saying.	○	○	○	○	○	○	○
It's important for me to remove myself from analysis of something and remain as objective as possible.	○	○	○	○	○	○	○
I can obtain insight into opinions that differ from mine through empathy.	○	○	○	○	○	○	○
I tend to put myself in other people's shoes when discussing controversial issues, to see why they think the way they do.	○	○	○	○	○	○	○
I try to listen to other people's position with a critical eye.	○	○	○	○	○	○	○
I find that I can strengthen my own position through arguing with someone who disagrees with me.	○	○	○	○	○	○	○
I'm more likely to try to understand someone else's opinion than to try to evaluate it.	○	○	○	○	○	○	○
One could call my way of analyzing things "putting them on trial", because of how careful I am to consider all of the evidence.	○	○	○	○	○	○	○
I try to think with people instead of against them.	○	○	○	○	○	○	○
I often find myself arguing with the authors of books I read, trying to logically figure out why they're wrong.	○	○	○	○	○	○	○
I have certain criteria I use in evaluating arguments.	○	○	○	○	○	○	○
I try to "shoot holes" in what other people are saying to help them clarify their arguments.	○	○	○	○	○	○	○
I feel that the best way for me to achieve my own identity is to interact with a variety of other people.	○	○	○	○	○	○	○
I am always interested in knowing why people say and believe the things they do.	○	○	○	○	○	○	○
I spend time figuring out what's "wrong" with things; for example, I'll look for something in a literary interpretation that isn't argued well enough.	○	○	○	○	○	○	○
I enjoy hearing the opinions of people who come from backgrounds different from mine—it helps me understand how the same things can be seen in such different ways.	○	○	○	○	○	○	○
I value the use of logic and reason over the incorporation of my own concerns when solving problems.	○	○	○	○	○	○	○
The most important part of my education has been learning to understand people who are very different from me.	○	○	○	○	○	○	○
I like to understand where other people are "coming from", what experiences have led them to feel the way they do.	○	○	○	○	○	○	○

Appendix I

Transcription symbols

The symbols used in the transcriptions of the students' oral interactions are described in the following way:

:	Colon(s): Extended or stretched sound, syllable, or word
___	Underlining: Vocalic emphasis
(.)	Micropause: Brief pause of less than (0.2)
(1.5)	Timed Pause: Intervals occurring within and between same or different speaker's utterance
(( ))	Double Parentheses: Details
( )	Single Parentheses: Doubts in the transcribed material
.	Period: Falling vocal pitch
?	Question Marks: Rising vocal pitch
↑ ↓	Arrows: Pitch resets; marked rising and falling shifts in intonation
° °	Degree Signs: A passage of talk noticeably softer than surrounding talk
=	Equal Signs: Latching of contiguous utterances, with no interval or overlap
[ ]	Brackets: Speech overlap.
[[ ]]	Double Brackets: Simultaneous speech orientations to prior turn
!	Exclamation Points: Animated speech tone.
-	Hyphens: Halting, abrupt cut off of sound or word.
> <	Less than/Greater than Signs: Portions of an utterance delivered at a pace noticeably quicker than surrounding talk
OKAY	CAPS: Extreme loudness compared with surrounding talk
hhh	.hhh H's: Audible outbreaths, possibly laughter. The more h's, the longer the aspiration. Aspirations with periods indicate audible inbreaths (e.g., .hhh). H's within (e.g., ye(hh)s) parentheses mark within-speech aspirations, possible laughter
pt	Lip Smack: Often preceding an inbreath
hah	Laugh Syllable: Relative closed or open position of laughter
heh	
hoh	
$	Smile Voice: Laughing/chuckling talk between markers

Retrieved from http://talkbank.org/media/PDF/JOC-PDF/Appendices/7-appendix.pdf

Appendix J
Pre-Posttest (Pilot)

Name:_____ Research Code: _____

LM-1001, Group:_____

Look at the following list of words and give each one a number rating 1-5 on how well you know the word.

Look at the Vocabulary Knowledge Scale (VKS) below:

1. I don't remember having seen this word before.
2. I have seen this word before but I don't know what it means.
3. I have seen this word before and I think it means…(synonym or translation)
4. I know this word: it means….(synonym or translation)
5. I can use this word in a sentence, e.g….(If you do this section, please do # 4 too.)

(Source: Wesche & Paribakht (1996). Assessing second language vocabulary knowledge: Depth vs. breadth. *Canadian Modern Language Review*, 53, pp. 13-40.)

English word	1-5	Traducción o sinónimo	English sentence
Abroad			
Acumen			
Advisor			
Booze			
Bully			
Catawampus			
Crosswalk			
Crowded			
Dare			
Debit card			
Degree			
Disclaimers			
Fiber			
For good			
Freezing			
Groceries			
Hindsight			
Landlord			
Lazy bums			
Leather-bound			
Liable			
Lollygagging			
Lurch			
Nourishing			
Placement			

Playing catch			
Pranks			
Royalties			
Run errands			
Schedule			
Scholarship			
Shenanigans			
Sighing			
Snooker			
Spasm			
Splurged			
Swanky			
Swing			
Thirtysomethings			
Tuition			
Vacancy			
Weather			
Whole grains			
Widow			

Appendix K

Post Hoc Tests Multiple comparisons

Gender of respondent	Dependent Variable	(I) Treatment A, B and Control	(J) Treatment A, B and Control	Mean Difference (I-J)	Std. Error	Sig.
	Bonferroni	Web Multimodality with Dialogical Interactions	Web Multimodality without Dialogues	-3.517	5.296	1.000
			Control Group	7.733	4.993	.388
		Web Multimodality without Dialogues	Web Multimodality with Dialogical Interactions	3.517	5.296	1.000
			Control Group	11.250	5.296	.120
		Control Group	Web Multimodality with Dialogical Interactions	-7.733	4.993	.388
			Web Multimodality without Dialogues	-11.250	5.296	.120
			Web Multimodality without Dialogues	-23.931*	7.128	.005
	Bonferroni	Web Multimodality with Dialogical Interactions	Web Multimodality without Dialogues	4.133	6.684	1.000
			Control Group	28.064*	6.168	.000
		Web Multimodality without Dialogues	Web Multimodality with Dialogical Interactions	-4.133	6.684	1.000
			Control Group	23.931*	7.128	.005
		Control Group	Web Multimodality with Dialogical Interactions	-28.064*	6.168	.000
			Web Multimodality without Dialogues	-23.931*	7.128	.005
			Control Group	21.24026*	5.52401	.002
		Web Multimodality without Dialogues	Web Multimodality with Dialogical Interactions	-11.11905	5.85765	.201
			Control Group	10.12121	6.16229	.332
		Control Group	Web Multimodality with Dialogical Interactions	-21.24026*	5.52401	.002
			Web Multimodality without Dialogues	-10.12121	6.16229	.332
			Web Multimodality without Dialogues	-2.143	4.723	.893

Bonferroni	Web Multimodality with Dialogical Interactions	Web Multimodality without Dialogues	-.905	4.224	1.000
		Control Group	1.238	4.723	1.000
	Web Multimodality without Dialogues	Web Multimodality with Dialogical Interactions	.905	4.224	1.000
		Control Group	2.143	4.723	1.000
	Control Group	Web Multimodality with Dialogical Interactions	-1.238	4.723	1.000
		Web Multimodality without Dialogues	-2.143	4.723	1.000
		Web Multimodality without Dialogues	-24.154*	6.009	.001
Bonferroni	Web Multimodality with Dialogical Interactions	Web Multimodality without Dialogues	3.111	5.492	1.000
		Control Group	27.265*	6.077	.000
	Web Multimodality without Dialogues	Web Multimodality with Dialogical Interactions	-3.111	5.492	1.000
		Control Group	24.154*	6.009	.001
	Control Group	Web Multimodality with Dialogical Interactions	-27.265*	6.077	.000
		Web Multimodality without Dialogues	-24.154*	6.009	.001
		Web Multimodality without Dialogues	-22.20614*	3.94163	.000
Bonferroni	Web Multimodality with Dialogical Interactions	Web Multimodality without Dialogues	3.21053	3.56872	1.000
		Control Group	25.41667*	4.03039	.000
	Web Multimodality without Dialogues	Web Multimodality with Dialogical Interactions	-3.21053	3.56872	1.000
		Control Group	22.20614*	3.94163	.000
	Control Group	Web Multimodality with Dialogical Interactions	-25.41667*	4.03039	.000
		Web Multimodality without Dialogues	-22.20614*	3.94163	.000

Appendix L

Interaction Analysis Model for Examining Social Construction of Knowledge in Computer Conferencing

Phase I: Sharing / Comparing of Information. Stage one operations include:

A. A statement of observation or opinion [Ph1/A]
B. A statement of agreement from one or more participants [Ph1/B]
C. Corroborating examples provided by one or more participants [Ph1/C]
D. Asking and answering questions to clarify details of statements [Ph1/D]
E. Definition, descriptions or identification of a problem [Ph1/E]

Phase II: The Discovery and Exploration of Dissonance or Inconsistency Among Ideas, Concepts or Statements (This is the operation at the group level of what Festinger [1957] calls cognitive dissonance, defined as inconsistency between a new observation and the learner's existing framework of knowledge and thinking skills.) Operations which occur at this stage include:

A. A. Identification and stating areas of disagreement [Ph2/A]
B. Asking and answering questions to clarify the source and extent of disagreement [Ph2/B]
C. Restating the participant's position, and possibly advancing arguments or considerations in its support by references to the participant's experience, literature, formal data collected, or proposal of relevant metaphor or analogy to illustrate point of view [Ph2/C]

Phase III: Negotiation of Meaning / Co-Construction of Knowledge

A. Negotiation or clarification of the meaning of terms [Ph3/A]
B. Negotiation of the relative weight to be assigned to types of argument [Ph3/B]
C. Identification of areas of agreement or overlap among conflicting concepts [Ph3/C]
D. Proposal and negotiation of new statements embodying compromise, co-construction [Ph3/D]
E. Proposal of integrating or accommodating metaphors or analogies [Ph3/E]

Phase IV: Testing and Modification of Proposed Synthesis or Co-Construction

A. Testing the proposed synthesis against "received fact" as shared by the participants and/or their culture [Ph4/A]
B. Testing against existing cognitive schema [Ph4/B]
C. Testing against personal experience [Ph4/C]
D. Testing against formal data collected [Ph4/D]
E. Testing against contradictory testimony in the literature [Ph4/E]

Phase V: Agreement Statement(s) / Applications of Newly-Constructed Meaning

A. Summarization of agreement(s) [Ph5/A]
B. Applications of new knowledge [Ph5/B]
C. Metacognitive statements by the participants illustrating their understanding that their knowledge or ways of thinking (cognitive schema) have changed as a result of the conference interaction [Ph5/C]